The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Vol. XXIV, No. 7 CHICAGO March 26, 1921

POST-OFFICE ENTRY — Entered as second-class matter, July 2, 1907, at the Chicago, Ill., Post-office, under the Act of March 3, 1879.

ROCK PRODUCTS—
Geo. P. Miller, Manager
E. M. Gibson, Assistant Manager

Published every other Saturday by
TRADEPRESS PUBLISHING CORP.
542 South Dearborn Street, Chicago, Ill.
W. D. Callender, President.
N. C. Rockwood, Vice-President.
Geo. P. Miller, Treasurer.
C. O. Nelson, Secretary.

TABLE OF CONTENTS

FEATURE ARTICLES

DEPARTMENTS

For Index to Advertisements See Page 99

The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Vol. XXIV, No. 7 CHICAGO March 26, 1921

POST-OFFICE ENTRY — Entered as second-class matter, July 2, 1907, at the Chicago, Ill., Post-office, under the Act of March 3, 1879.

ROCK PRODUCTS—
Geo. P. Miller, Manager
E. M. Gibson, Assistant Manager

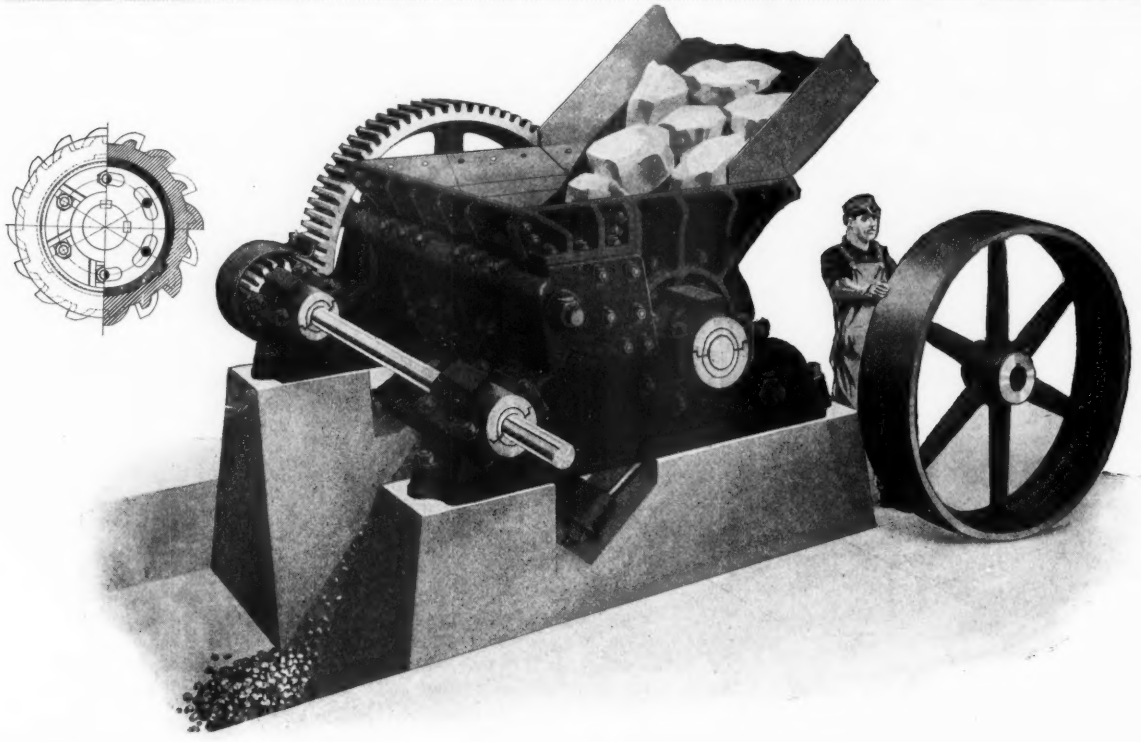
Published every other Saturday by
TRADEPRESS PUBLISHING CORP.
542 South Dearborn Street, Chicago, Ill.
W. D. Callender, President.
N. C. Rockwood, Vice-President.
Geo. P. Miller, Treasurer.
C. O. Nelson, Secretary.

TABLE OF CONTENTS

FEATURE ARTICLES

DEPARTMENTS

For Index to Advertisements See Page 99



Stevenson New Type Crusher

This is a Single Roll Swinging Plate Crusher—our Model A-339—and while it is new in design, and an innovation in the crushing industry, it is old enough to have proven its efficiency, value and worth.

All wearing parts of this machine are made of the very hardest and toughest materials—manganese and other heat-treated steels. The teeth on the roll are transferable, thereby keeping up the efficiency and reducing the upkeep costs, and roll disks can be assembled to accommodate material being crushed, staggering the teeth or placing them all in a straight line. The breaking plate is provided with liners, half and quarter soles, of manganese or other heat-treated steels, and these can be changed on the breaking plate, thereby getting three different wearings from the same piece of metal. The bearings are big and strong, amply providing for any emergency. The gear teeth are short stub type of immense strength.

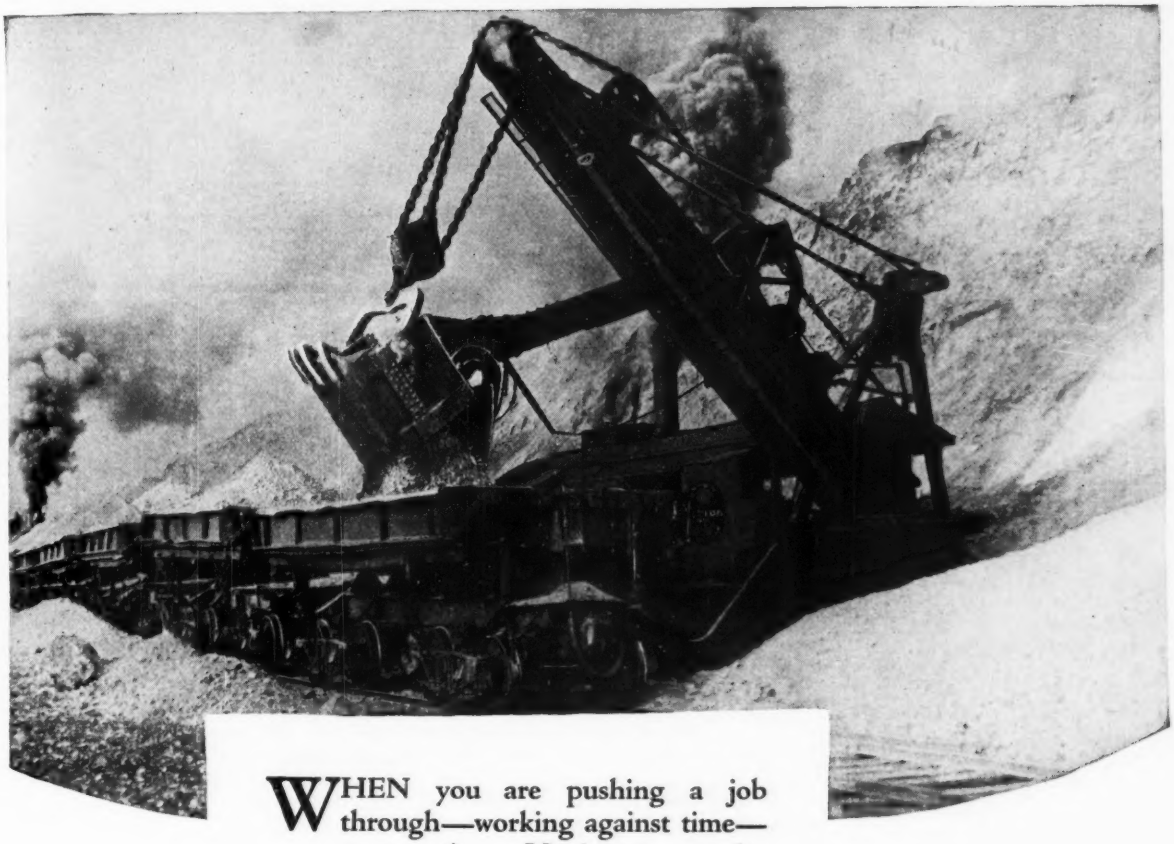
Stevenson Roll Crushers are self-feeding.

Write for catalog and complete information

The Stevenson Company

General Offices and Works—Wellsville, Ohio

Engineering and Western Sales Offices—Monadnock Building, Chicago, Illinois



WHEN you are pushing a job through—working against time—you want *action.* Maximum capacity must be maintained or the loading schedule will lag. It's then that the "Marion" service drives home the true meaning of "Marion" *quality and dependability.*

The continuous handling of heavy stone, either from the stock pile or quarry; the steady day-after-day grind when demand is the heaviest; the special drives for extra tonnage—all lay a severe burden on the loading equipment.

Marion Railway Type Shovels are designed for just such service. Their rugged construction and speed of operation insure steady performance and satisfactory service.

THE **Marion** STEAM SHOVEL CO.

Established 1884 Marion, Ohio

New York · Chicago Atlanta San Francisco

Boise, Idaho, - Clyde Equipment Co.
Billings, Mont., F. B. Connelly Co.
Dallas, - F. B. Wright, Bush Bldg.
Denver, - - - H. W. Moore & Co.
Detroit, W. H. Anderson T. & S. Co.
Vancouver, - - - - - - - - - - - Vancouver Machinery Depot, Ltd.
Montreal, Toronto, - - - - - - - - - - - F. H. Hopkins & Co., Ltd.
Philadelphia, H. L. Cox, 13 & Cherry
Pittsburgh, - - - J. W. Patterson
Portland, - - Clyde Equipment Co.
Salt Lake City, H. W. Moore & Co.
Seattle, - - Clyde Equipment Co.

EVERYWHERE RELIABLE — THE Marion STEAM SHOVEL CO. — ESTABLISHED 1884

EXPLOSIVES ~ SERVICE

COMPLETE—

From the Laboratory to the Point where Explosives are used

WE do not consider that our work begins with the manufacture of high-grade explosives and ends with their sale to the user.

Preceding production and progressing with it, come research and experimentation that require the work of over 300 chemical and ballistic engineers. Through their efforts, new and more efficient explosives are being constantly developed, and careful check is kept on every stage of manufacture, insuring that uniform high quality for which Du Pont Explosives have been noted for more than a century.

Their work is supplemented right at the point where explosives are used by a corps of highly trained field representatives whose business is to determine the most efficient and most economical type of explosives for every kind of work under every condition. And it is also their business to assist every user of Du Pont Explosives, whenever it is desired, by applying their specialized knowledge to the customer's particular work with a view to determining the most economical and efficient solution of his problems.

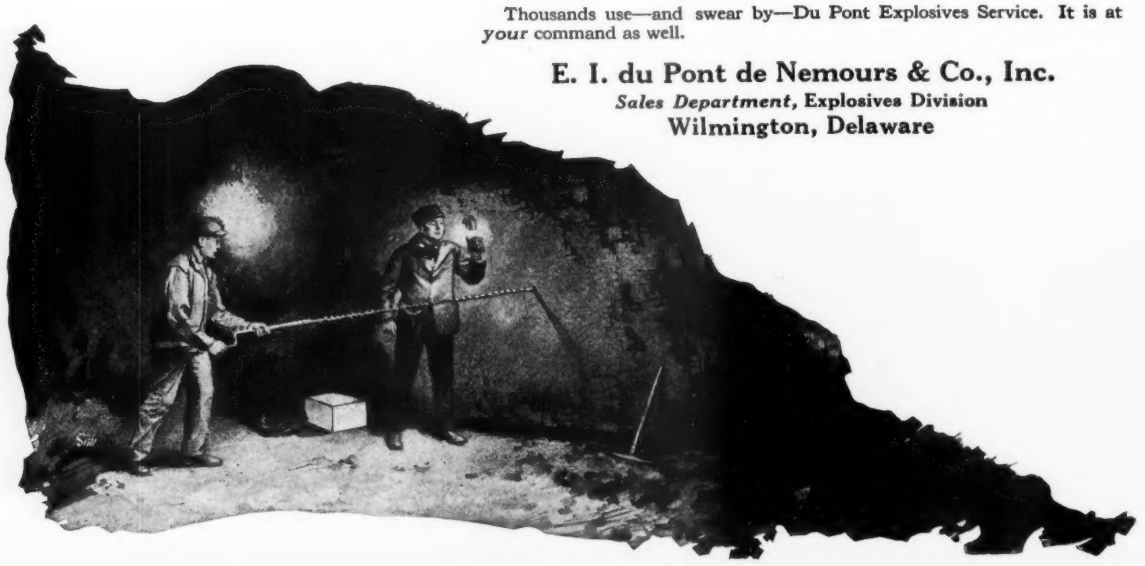
Perhaps these two—the "before" and "after"—features of Du Pont Explosives Service are largely responsible for the present confidence with which users of explosives regard Du Pont Explosives and the Du Pont Company.

Thousands use—and swear by—Du Pont Explosives Service. It is at *your* command as well.

Branch Offices:
Birmingham, Ala.
Boston, Mass.
Buffalo, N. Y.
Chicago, Ill.
Denver, Colo.
Duluth, Minn.
Huntington, W. Va.
Joplin, Mo.
Juneau, Alaska
Kansas City, Mo.
New York, N. Y.
Pittsburgh, Pa.
Portland, Ore.
St. Louis, Mo.
San Francisco, Calif.
Scranton, Pa.
Seattle, Wash.
Spokane, Wash.
Springfield, Ill.

Du Pont Products Exhibit
Atlantic City, N. J.

E. I. du Pont de Nemours & Co., Inc.
***Sales Department*, Explosives Division**
Wilmington, Delaware



VULCAN INDUSTRIAL LOCOMOTIVES and leading Industrial Concerns

Syracuse and Milford Railway

The rapid expansion of transportation opened the opportunity for the development of large manufactories, which were enabled to attain their modern colossal size in no small measure as the result of the production of Portland Cement.

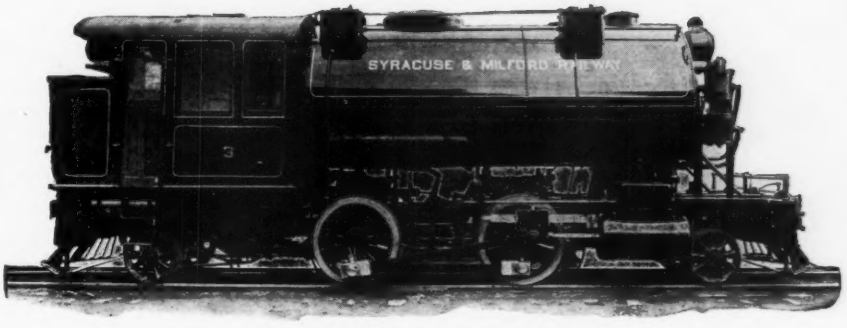
Out of the many producers of this construction material, a few manufacturers stand out as the giants of the industry.

The development of VULCAN Industrial Locomotives has kept pace with this industry and VULCAN Locomotives and Rotary Kilns are used in every cement producing state in the country.

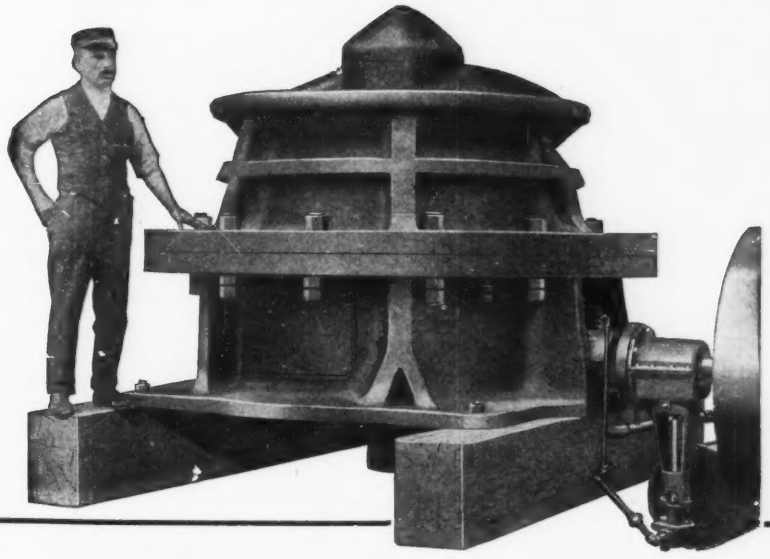
VULCAN IRON WORKS

Established 1849

1753 Main Street **Wilkes-Barre, Pa.**



Used in the Manufacture of Portland Cement



TELSMITH— THE WORLD'S MOST EFFICIENT SECONDARY CRUSHER

TELSMITH is a secondary crusher, operating on the gyratory crushing principle, but with the discharge diameter increased to compensate for the reduced width of the discharge opening.

TELSMITH combines the simplicity of the familiar gyratory crusher, but with a **rigid unbreakable shaft** and short massive frame.

TELSMITH works to best advantage when **choke fed.** Does splendid work with gravity feed under a 25 ft. head of rock. No mechanical or hand-feeding necessary.

TELSMITH makes a 7-to-1 ratio of reduction and makes it economically. (See screen analysis below). The capacity is enormous — the power consumption remarkably low — the upkeep moderate. It's the simple, rugged, dependable secondary crusher that your master mechanic longs for. Write for catalog No. 166 (Telsmith Primary Breaker) and bulletin No. 4-F-11 (Telsmith Reduction Crusher).

SMITH ENGINEERING WORKS
3188 Locust St. **Milwaukee, Wis.**

CANADIAN REPRESENTATIVES:
Canadian Ingersoll-Rand Co., Montreal, P. Q.

No. 4 TELSMITH REDUCTION CRUSHER—Maximum size of feed, 7 in. cubes; minimum discharge opening, ¾ in.; size of motor recommended, 50 H.P.; net weight, 45,000 lbs.; size of pulley, 48 in. x 14 in.; speed of pulley, 275 R.P.M.; capacity per hour with ¾-in. bottom opening, 50-60 tons; screen analysis on hard Wisconsin granite with 15/16 in. bottom opening (using Tyler's standard testing sieves) as follows: Retained on 1.05 in. opening, 12.5%; on .742 in. opening, 25.3%; on .525 in. opening, 22.8%; on .371 in. opening, 10.9%; on .263 in. opening, 8%; on .093 in. opening, 9.5%; on .046 in. opening, 6.2%; thru .046 in. opening, 4.8%.

Old Colony Bldg., Chicago, Ill.
6110 Euclid Ave., Cleveland, O.
Bowman Mchy. Co. Omaha, Neb.
50 Church St., New York City
2540 UniversityAve. St. Paul, Minn.
528 Boston Bldg., Denver, Colo.
806 Otis Bldg. Philadelphia, Pa.
Franklin and Channing Aves., St. Louis, Mo.
Salt Lake Hardware Co., Salt Lake City, Utah
281 Franklin St. Boston, Mass.
325 W. Main St. Louisville, Ky.
625 Market St., San Francisco, Calif.
110 W. Park Way, N. S., Pittsburgh, Pa.
Chester, Florida
Road Bldrs. Eq. Co., Portland, Ore.

Rock Products

Vol. XXIV Chicago, March 26, 1921 No. 7

Retail Side of the Ohio River Sand and Gravel Co's Operation

Washed and Sized Material Handled from Barge to Motor Trucks by Special Yard Equipment

THE OHIO RIVER SAND AND GRAVEL CO., Louisville, Ky., which handles 2,000 cu. yds. of sand and gravel per day through its wholesale and retail yards is one of the largest river operators in the Louisville district.

In order to get such a large quantity of aggregate to the yards, the company operates three sand and gravel dredges, 21 barges and a steam tug. The dredges are equipped with manganese-steel centrifugal sand pumps which are belt driven from reciprocating engines. One digger has a 12-in. pump and the other two, each have 10-in. pumps. In the near future the capacity of the small diggers will be greatly increased by replacing the 10-in. pumps with 15-in. pumps.

The sand and gravel and an abundance of water are pumped up to a cylindrical screen where the material over 1½-in. is rejected to the river and the rest is washed and classified into gravel, coarse sand and fine sand. Thus each digger may load three barges at the same time.

The little tug boat often transports as many as six or eight barges down the river to the yards. The yards differ from most sand and gravel operations in that they are merely a large storage space and loading point for railway cars. The material has already been washed and sized when it reaches the shore.

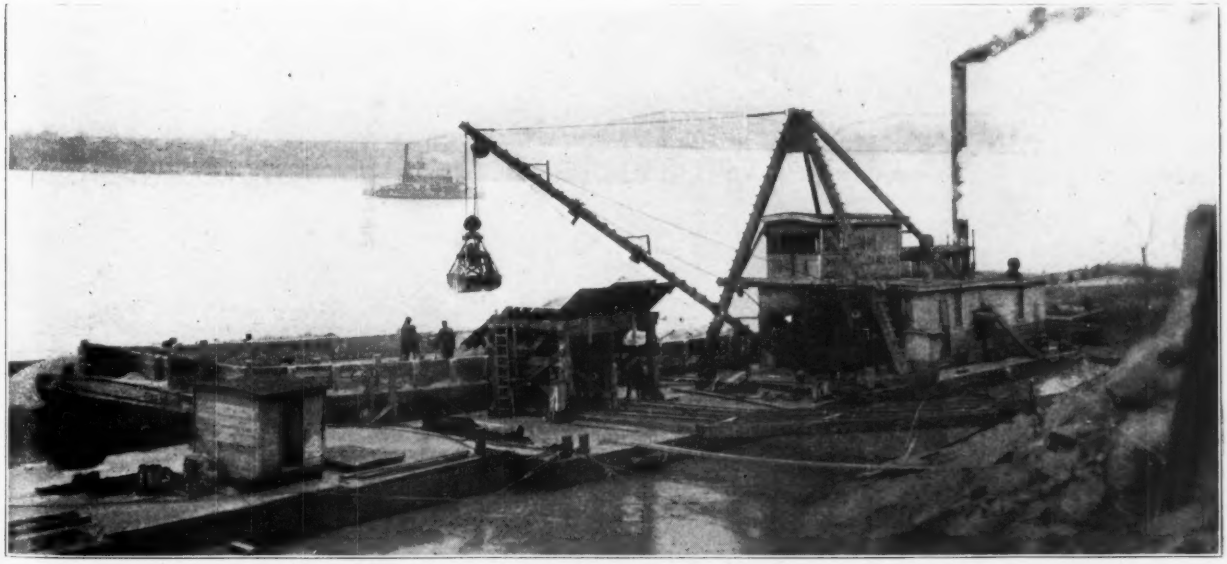
Yard Operation

The sand and gravel is unloaded from the barge by a 2½-cu. yd. floating clam-shell bucket which is operated by a derrick. It has been found advisable to make three cuts across a barge in unloading it, in order not to cause undue strain or parting of the seams. The current moves the boat down under the clam-shell and a cable and hoisting engine is used to draw it back up against the current. The largest barges have a capacity of 125 to 150 cu. yds. and the 2½ cu. yd. clam-shell can unload about seven of these per day.

The views will give a good idea of the operation. The material is loaded into a small hopper which is elevated so that a 5-ton steel car may run underneath and be loaded from a slide gate in the bottom.

These cars are drawn up a 30 degree incline to a trestle which has branches over the entire yards. This trestle is about 25 ft. above the ground.

The incline up which the cars are drawn is slightly different from similar equipment elsewhere because of the wooden drum and the cable arrangement used to elevate and lower cars. The incline has two tracks on it; one being used for elevating loads and the other for lowering empties. A hoisting engine is used to rotate a large wooden drum upon which two cables are fastened so that while one is winding up



The river equipment of the Ohio River Sand and Gravel Company for unloading barges and loading it into cars for delivery to the storage plant or loading bins

and pulling up a loaded car, the other is unwinding and lowering an empty car into place under the loading hopper.

There are three ways of disposing of gravel after it is elevated to the top of the trestle. Material that is to be shipped as wholesale is run on a track over the cars and dumped directly into them. Material for the retail trade is either dumped into large concrete bins used to load teams and trucks, or it is dumped into the ground storage.

The company has a ground storage capacity of over 25,000 cu. yds. which is always filled by fall for the winter retail business. In order to get this out of storage, wagon loaders are used.

The company owns a large fleet of motor trucks for city delivery and a number of the local contractors also send in their trucks to get sand and gravel. A view is included of the fireproof garage used to house the trucks.

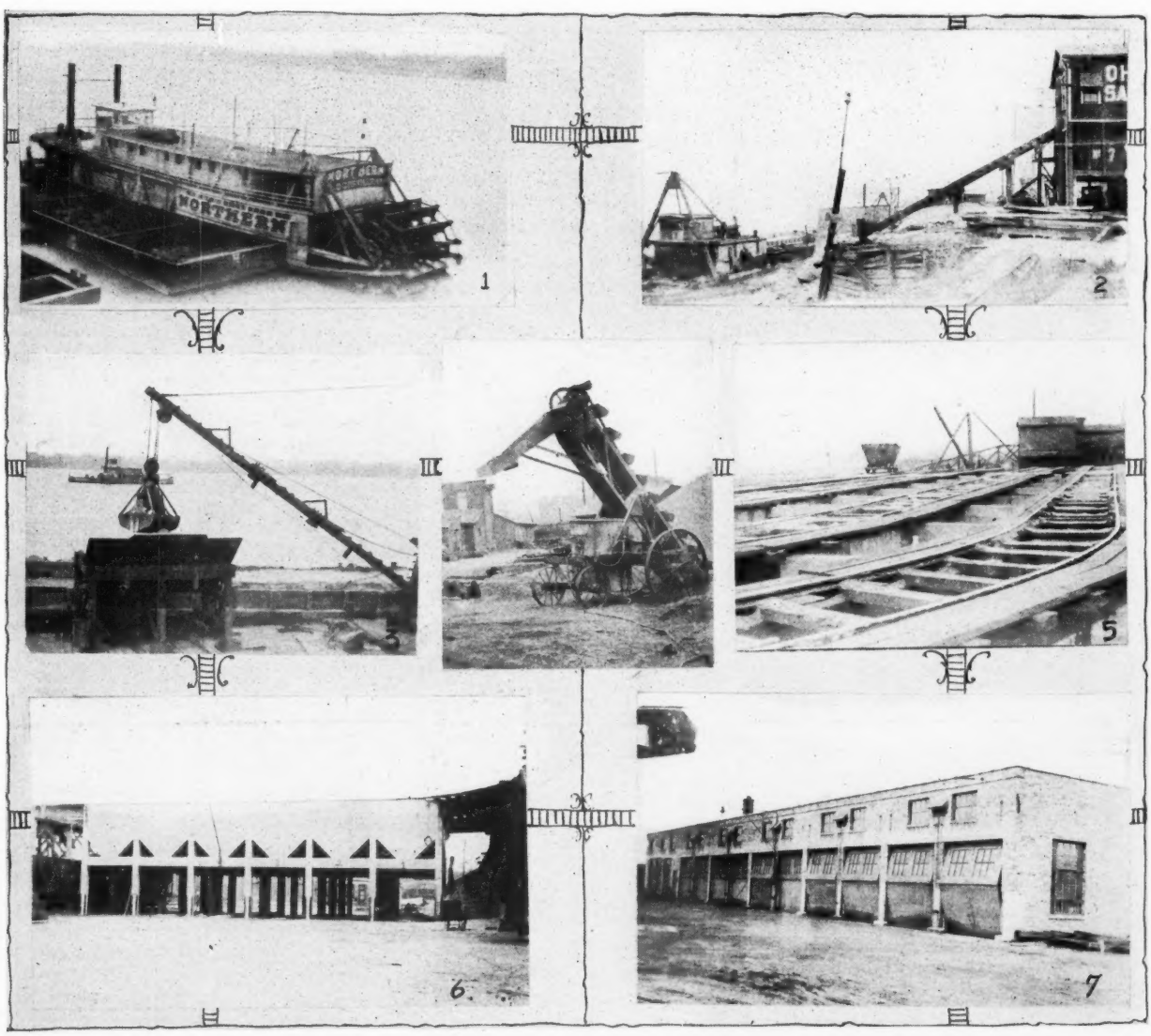
John M. Settle is the general manager of the Ohio River Sand and Gravel Co., and Haman Duffy is superintendent.

Sand and Gravel Deposits of Georgia

THE STATE GEOLOGICAL SURVEY has just issued a report on the sand and gravel deposits in Georgia, which contains data of much value in highway construction. This is a bulletin of 400 pages, illustrated with 40 halftones, 13 sketches and one map, which shows in color the location of the sand and gravel deposits throughout the State.

The first 43 pages describe in detail the properties of sand and gravel, together with a general classification of sand according to its origin, chemical and mineralogical content, grain size and use. The methods of transportation, production and preparation of sand and gravel are given in a 30-page discussion. The greater part of the report is given over to a detailed description of the individual sand and gravel deposits. There are no very large sand and gravel operations in this state at present.

The report is Bulletin No. 37 of the State Geological Survey, entitled "A Report on the Sand and Gravel Deposits of Georgia," by L. P. Teas, Assistant State Geologist. Copies will be mailed by Prof. S. W. McCallie, State Geologist, to any citizen of the State upon receipt of 15 cents postage.



(1) The tow boat used to draw the scows from the digger to the plant; (2) Incline from water level to the plant; (3) Close-up view of the hopper from which the small cars are loaded; (4) The type of wagon loader used to load wagons and trucks from the storage; (5) View over top of loading bin shown in view six; (6) Concrete bins for loading trucks; (7) Garage

A 16-Inch Pumping Plant for Sand and Gravel

Cleveland (Ohio) Builders Supply and Brick Company Has One of the Most Modern Plants of Its Kind

By Victor J. Milkowski

Engineer in Charge of Dredge Department, Morris Machine Works, Baldwinsville, N. Y.

THE SAND AND GRAVEL PLANT of the Cleveland Builders Supply and Brick Co., at Aurora Station, near Cleveland, O., is one of the largest and one of the most up-to-date plants of its kind in existence.

The plant is located on a small stream, which it was necessary to dam up in order to secure sufficient water to float the dredge when starting the operations.

The material is hard and sharp, varying in size from fine sand to large boulders. On the whole, it has been found to be well adapted for pumping, although occasionally some hard layers have been encountered.

Pumping Plant

The plant is electrically operated throughout, using 3-phase, 60-cycle, 440-volt current. A spur track connects the plant with the main line of the Erie Railroad, thus providing good railroad facilities.

Figs. 1 and 2, placed side by side, present a panoramic view of the entire plant except for some 300 ft. left out between the two photographs. The dredge in Fig. 2 pumps the material direct onto the screens, where it is screened and graded, while the waste water is returned to the stream. At the time these photographs were taken, the dredge was discharging through 500 ft. of 16-in. pipe to a height of 57 ft. above the water surface.

Fig. 3 shows the general view of the dredge. The hull is 70 ft. long, 26 ft. wide 5 ft. 3 in. deep, with a well in front

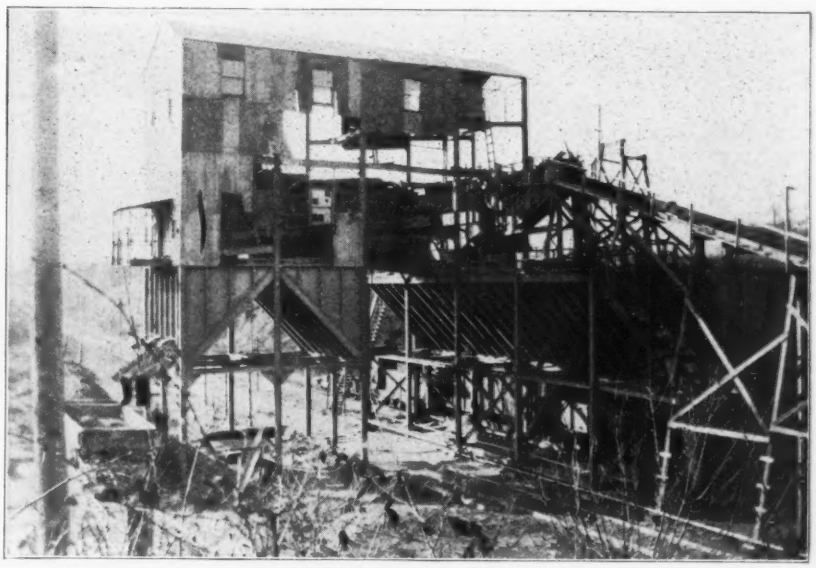


Fig. 1. Screening and washing plant at Aurora Station, Ohio

Fig. 2. Pontoon supported pipe line from dredge to shore plant

for the suction pipe as shown in Fig. 4.

The suction is arranged with hinged arms and gimble ring as shown in Fig. 4, the suction hose passing through the gimble ring. This arrangement gives full flexibility to the suction and prevents any kinks or strain on the hose. The suction pipe is 18-in. O. D. and is of sufficient length to excavate to a depth of 40 ft. below water surface. No agitator is provided on the suction as the material is sufficiently loose to be picked up by the suction force of the pump.

The pump is an 18-in. diameter suction and a 16-in. diameter discharge Morris heavy duty dredging pump directly connected to a 400-h. p., 400-r. p. m. variable speed induction motor.

For priming and for supplying water for general purposes on board, there are provided two 4-in. centrifugal pumps, directly connected to 25-h. p., 1,800-r. p. m. motors. Only one of these pumps is in service at a time, the other being used as a spare.

J. F. Kelly, superintendent

The most noteworthy feature of the installation is the complete equipment of hoisting and pulling lines. The hoist has six drums, arranged in pairs on a common frame as shown in Fig. 5. It is driven by a 25-h. p., 720-r. p. m. motor. The purposes of these drums are as follows: One drum for raising and lowering the suction pipe; two drums for the forward quarter lines, two drums for the aft quarter lines, one drum for a spare. By means of the forward and the aft quarter lines, the dredge can be moved forward and aft and to either side, and held steadily in any position desired.

In addition to the above, there is a winch head provided on each side of the deck house to give a pull on the rope if desired.

The entire control of the dredge, including the switchboard and control apparatus for the main motor and the operating levers for the hoist, is centered in the pilot house so that one man operates the whole dredge. The elevated position of the deck house and the ample windows afford the operator a good view all around and, by means of a telephone, he is in constant communication with the screening plant.

The current is conveyed on board the dredge by means of water-proof cables, carried on pontoons as shown in Fig. 2.

Screening Plant

Fig. 6 shows a view of the screening plant taken from the opposite side to that shown in Fig. 1. The screens are of the gravity type, and the entire screening plant is built of steel. Originally, a gyratory crusher was installed on top to crush the oversized material, but this was found objectionable on account of the vibrations set up in the whole structure.

The maximum output of the plant, recorded, is 2,310 tons in nine hours. The output on the plant, however, was curtailed most of the time by the lack of cars, so that last season's output is estimated at only 120,000 tons.

Careful data has been kept regarding the life of dredging pump parts, and it has been found that the life of a pump shell is about 170,000 tons, while that of the impeller and the suction disc is only about one-half of that amount.

Fig. 3. General view of 16-in. hydraulic dredge

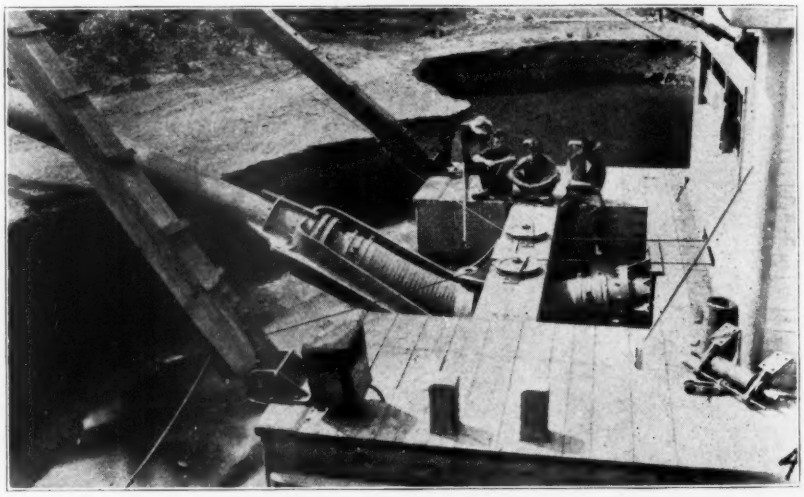


Fig. 4. Suction intake details on dredge

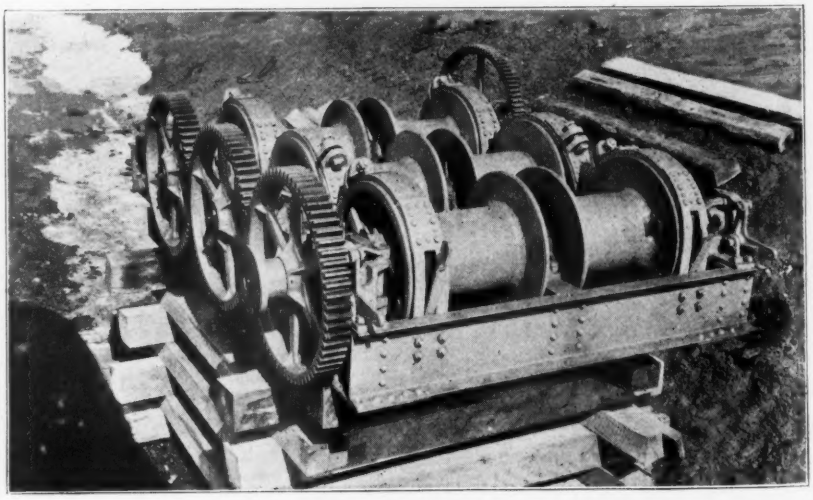


Fig. 5. Six-drum hoist driven by 25-h.p. electric motor

The entire operation of the plant is under the direction of J. F. Kelley, who has been connected with the plant since it was first installed in 1916. Previous to that, Mr. Kelley was a captain and an operator on several of the large dredges used on the New York State Barge Canal construction.

Concrete Roofing Tile

CONCRETE ROOFING TILE are generally produced in standard size of 9 3/16 in. by 14¾ in., over all dimensions. Their weight is approximately 5½ lbs. each. One hundred and fifty tile are required per square of 100 sq. ft., which weight when applied in place, about 825 lbs. They are usually furnished with double side lock for efficient exclusion of weather. Owing to their accurate plane surfaces and freedom from warpage, three inches end lap is sufficient for good construction.

They are commonly furnished in standard colors of red, green, brown and natural gray, and can be furnished in various other special shades, if desired.

Concrete tile roofs are permanent, requiring no maintenance expense and are practically indestructible. They improve with age and are exceeded in durability by no other known material. Joints between the tile permit expansion and contraction, thus eliminating danger of destruction due to temperature changes. They are unique in the high salvage value afforded, in event of wreckage or alteration of structures on which they are placed. Concrete tile are permanently attractive, their surface being smooth and non-absorptive; they do not discolor.

Concrete roofing tile are moderate in first cost. The reduction in insurance premiums will much more than pay for the interest on the additional investment over less fireproof roofings. Their rich and substantial appearance enhances the sale value of the house on which they are applied, by several times their total cost.

They reduce fuel consumption in Winter and assist in keeping a house cool in Summer, the dead air space between sheathing and tile being a most efficient insulator.

Their uniform size and true surface render it possible to erect them more rapidly and economically than any other roofing tile product and has led to their favorable recognition by labor. They have been approved as loan risks by financial interests.

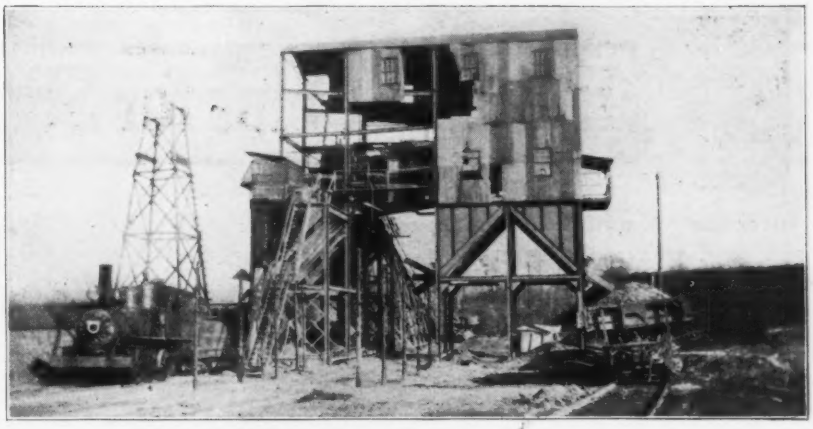


Fig. 6. Another view of the screening plant

Concrete roofing tile—a new and rapidly growing use of concrete

Hints and Helps for Superintendents

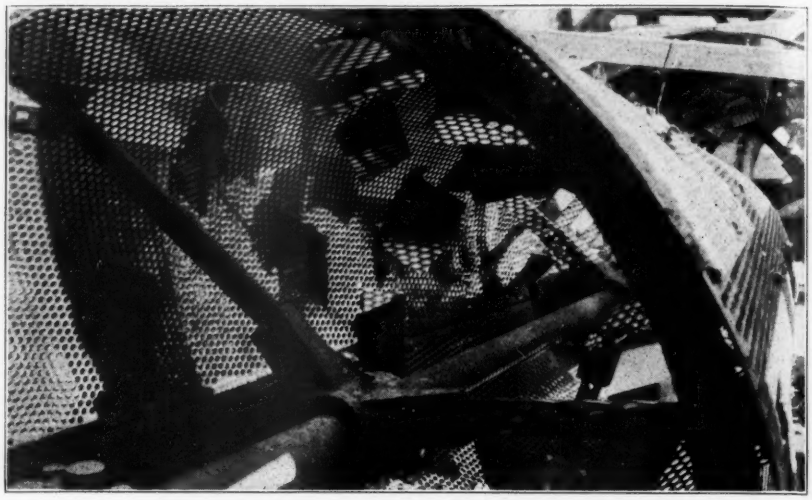
Increasing Capacity of Sand and Gravel Screens

THE VIEW to the right herewith shows a scheme used at the plant of the Island Sand and Gravel Co., Columbus, O., to increase the capacity of rotary screens, which experience in operation showed were placed at too steep an incline for best results.

Probably this is a condition often met with in new sand and gravel plants as the angle of inclination of the screen depends somewhat on the nature of the material and this can be determined only by experience with it.

The cure is very simple, consisting merely of bolting angle-iron baffles to the screen, using the screen perforations for the bolt holes. These baffles are staggered as the view shows, to retard the flow of the material as much as desired. As many or as few baffles as conditions warrant may be used.

H. H. Layton is superintendent of the sand and gravel plant, which is a part of the operations of the Columbus Consumers Supply Co.



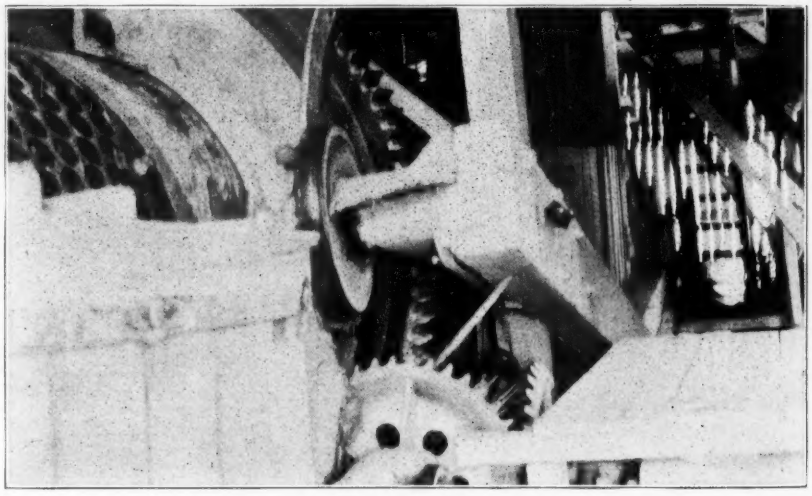
Baffles to increase efficiency of rotary gravel screen

Rotary Screen With a Cantilevered End

THE THRUST of an open-end stone screen is ordinarily taken care of by roller bearings at the end of the screen. At the plant of the Norton Lime and Stone Co., Cobleskill, N. Y., it was evidently found desirable to add to the length of the screen after it had been installed. This was done by attaching a section to the end, which was supported by the part of the screen already in operation, as a cantilever. This cantilever section is possibly six or eight feet long, and screens a large-size stone for ballast or similar purposes.

To take care of the extra thrust and the stresses introduced by the cantilever end, two special roller bearings, like the one shown in the view, are supplied. These consist of rollers attached to heavy timbers extending back as ties to the base of the screen frame. It will be noted that these rollers are placed above the middle horizontal diameter of the screen, which helps them take a part of the bending stress introduced by the weight of the cantilever screen end and its load.

F. P. Norton is secretary and superintendent of this plant.



Thrust bearing cantilever extension of a rotary stone screen

Method of Turning a Railroad-Type Shovel in a Quarry

"IN WORKING OUR SHALE QUARRY each cut was carried lower than the preceding one," writes E. J. Strock, superintendent of the Colorado Portland Cement Co., Portland, Colo., in the December issue of the "Excavating Engineer." "This gave our floor a stairsteps appearance, and made it impossible to have any great width of level floor on which to turn our shovel. We expected to turn the shovel around when the cut we were then on was finished, and consequently had the rails bent, but no other preparations made.

"We suddenly ran into a pocket of gravel so extensive that it could not be stripped rapidly enough to allow us to continue quarrying there.

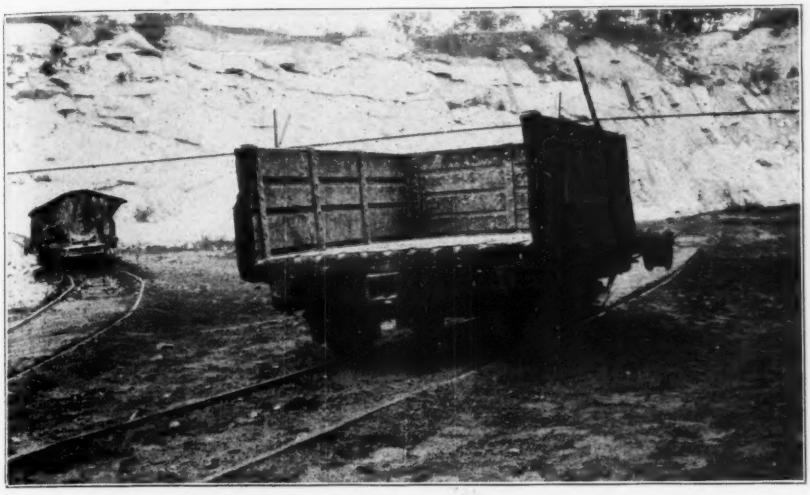
"The shovel, a 70 C Bucyrus, was backed to within its length of the place, where the new cut was to begin, chains were disconnected, and the rear end of the shovel jacked up.

"Our rails had been bent to a curve, the radius of which was the distance between truck centers. These rails were bridled together and laid loose on ties laid at right angles to the length of the shovel, but curved in the arc of a circle. The rear truck was then swung at right

angles to its usual position and lowered to the rails. The dipper hung free in front.

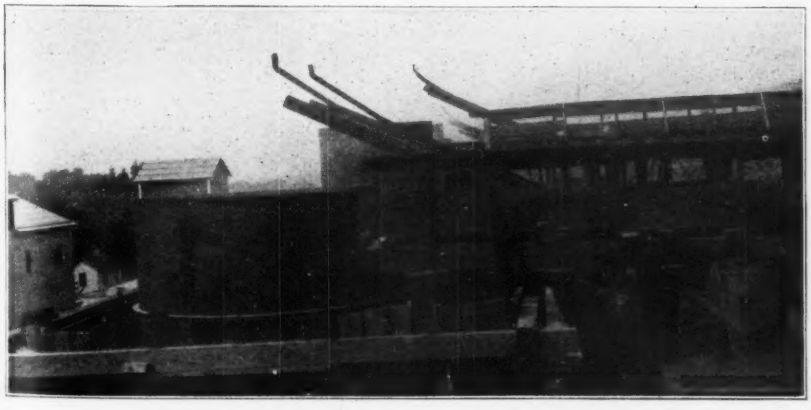
"The rear end was then moved around the curved rails until the front truck jammed. Next, the front end of the shovel was jacked up, the jack screws following closely in case a jack failed.

"When clear of the rails, the front truck was swung around in the same direction as the rear was moving until the truck jammed, the short section of track fitted under the truck in its new position, the truck lowered and the rear end again pinched over. This was repeated until the shovel was facing in a direction directly opposite to its original one.



Type of car used at plant of New England Lime Co., Canaan, Conn.

Trackways to top of battery of lime kilns



Kilns showing ends of track and how the cars dump

"As a sample of the speed of moving, the rear end was swung around 14 ft. in six minutes. The front end was jacked up and trucks swiveled to their extreme position and set on the rails in 12 minutes.

"We quarried shale the morning of April 5th, and got our material ready in the afternoon, turned the shovel the morning of the 6th, and quarried shale in the new cut the afternoon of the 6th. Of course we quarried lime with the other shovel both days. Had we known in advance that the change would have had to be made, the job could have all been done in one day."

Self-Dumping Quarry Cars for Lime Plant

THE VIEWS herewith show plant of the New England Lime Co., at Canaan, Conn., and how the kilns are charged by self-dumping cars.

The quarry is about a quarter of a mile from the kilns and in the hills back of the plant, so that there is a down-grade practically all the way from the quarry to the tops of the kilns. The cars are hauled by horses or mules to the ends of the trestles leading to the kilns.

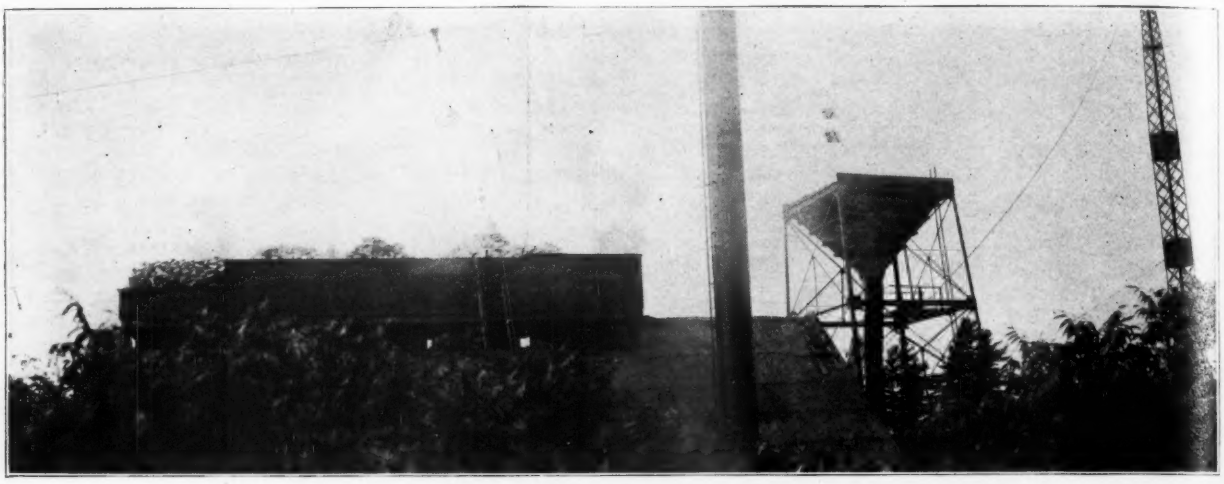
The tracks on these trestles are on a sufficient incline so that the loaded cars roll down by gravity, with sufficient velocity to cause the rollers at the ends of the car to continue on, up two special outside rails, thereby dumping the car automatically, from the force of its own momentum.

The construction of the car is clearly shown in the top view. As will be seen it is exceptionally rugged, having no movable parts.

Oxy-Acetylene and Electric Arc Welding

IN THE SECOND ANNUAL REPORT of the Canadian Klondyke Mining Co., Ltd., and the Canadian Klondyke Power Co., Ltd., attention is called to the value of oxy-acetylene and arc welding equipment, installed at a cost of $17,766. An additional arc welding unit of 1,000 ampere capacity was added to the repair equipment, at a cost of between $7,000 and $8,000. One of the major pieces of work accomplished by the oxy-acetylene and arc welding appliances was the reclamation from junk piles and scrap heaps of 68 buckets of 17 cu. ft. capacity which enabled an additional dredge to be operated. There were but few failures of the reclaimed buckets, and such as developed from time to time were replaced by other reclaimed buckets.

A large number of bucket pins were reclaimed by building up worn pins. Other worn parts offered opportunities for building up. By placing the welding equipment on the dredge considerable expense was saved by obviating the necessity for the removal of tumblers, plates, and other parts.



Left—Kiln hoppers for limestone. Right—Coal hopper and steel mast for cableway.

Swanton (Vermont) Lime Works

Coal Stored in Quarry—Cableway Handles Both Limestone and Coal

ONE OF THE FIRST modern, all-steel and concrete gas-producer fired lime plants erected is that of the Swanton Lime Works, Swanton, Vt., built in 1914-15. John P. Rich, owner and proprietor, was one of the first New England lime burners to make the change from wood fuel to producer gas successfully, and his experience has continued to be entirely satisfactory. He manufactures with his producer-gas fuel the same high quality of chemical lime that has made his brand famous, since the business was originally started by his father in 1847.

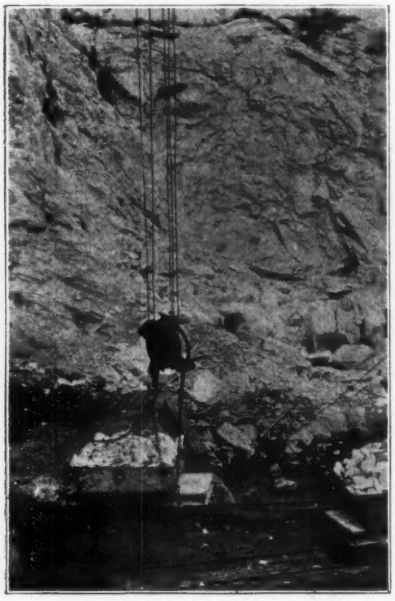
For making his producer gas Mr. Rich gets a high-grade Pennsylvania gas coal, and during the car shortage in 1920 his operation was considerably handicapped by lack of fuel. The views herewith show the quarry and lime plant soon after the coal had commenced to come through again, and how Mr. Rich is preparing to avoid a similar situation again.

Coal Stored in Quarry

Coal is brought to the lime plant generally in hopper-bottom dump cars. A timber trestle is built over one edge of the quarry excavation and the coal is dumped into a storage pile in the quarry. Enough coal could be stored in this manner for a whole season's run.

The handling of the coal from storage to bins is considerably facilitated in this instance by the method of quarry operation, but it would seem that most any

Samuel O'Neil, superintendent



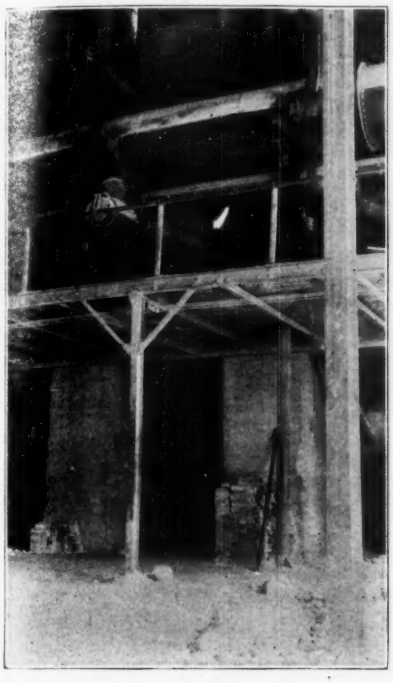
Skip filled with limestone

Coal stored in quarry; loaded out with same skips used for stone

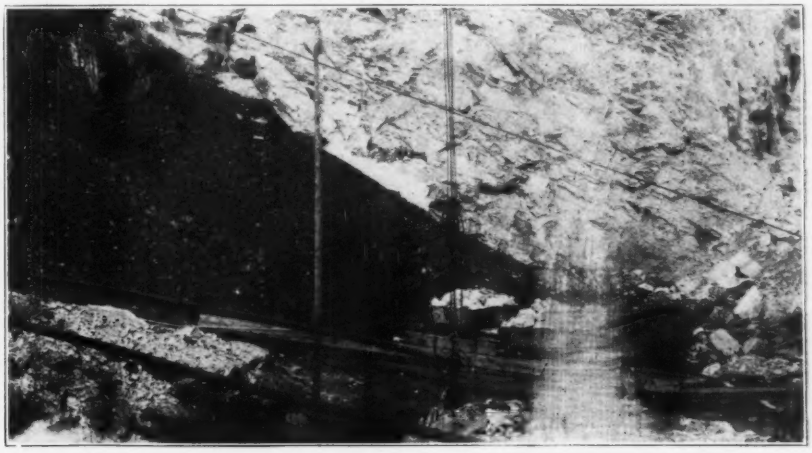
system of quarry operation could be made to serve the same end.

Here the stone is transported from the quarry to the kilns by means of a cableway and self-dumping skips. The skips are placed on flat cars in the quarry and are loaded by hand. They are picked up by a special type of carrier, which permits the hoist man to dump the skip from his operating house at the edge of the quarry, when the skip reaches a point over the kilns.

The tops of the five shaft kilns are enclosed in a rectangular box or hopper, from which they are all fed. This some-

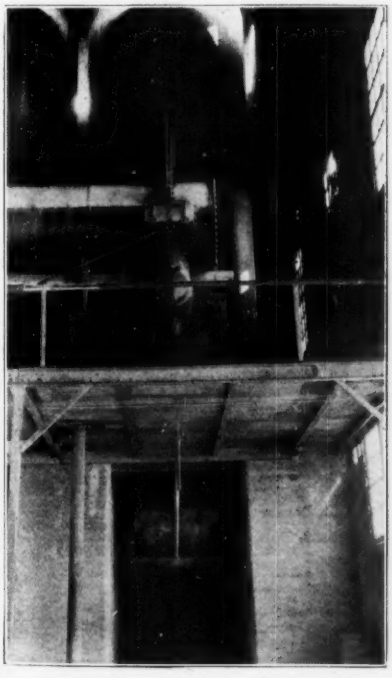


Interior of lime plant



Quarry floor showing storage pile of coal

Looking into quarry from coal trestle



Interior view showing kiln farthest from the gas producer. Note below in this view and the one to the right, the method of operating the shear gates on the bottom of the kiln by lever

Drawing floor of kiln room. Concrete kiln foundations and walls and structural steel superstructure—an absolutely fireproof lime plant

what simplifies the kiln-charging operation.

The handling of the coal for the gas producer is somewhat similar. A steel hopper is erected at one end of the plant and the skips of coal are dumped into it. This hopper feeds the gas producer by gravity, and eliminates any further coal handling from storage to the lime kilns.

Since this plant was constructed one kiln has been added to the original four, making five in all. Only four are operated at one time, but the fifth kiln makes it possible to utilize the full capacity of the gas producer when one of the kilns is being relined or is otherwise out of commission during the active season.

The problem of elimination of tar and dust accumulations in the gas pipes has not been settled entirely in this installation, but everything considered, this plant is probably one of the most efficiently operated lime plants in the country. The superintendent is Samuel O'Neil.

Service Bureau for Concrete Products Manufacturers

Portland Cement Association Ready to Aid in Solution of Problems

THE PORTLAND CEMENT ASSOCIATION maintains in its general offices at Chicago, with representatives in the 22 district offices of the association, a cement products bureau devoted largely to the problems attached to stimulating and improving the cement products industry in the United States and Canada. All products manufacturers are invited to make use of the services of this bureau and to co-operate with it.

Activities of the Cement Products Bureau fall in four classes: Production, technical, promotive and educational. In the production group of activities may be listed co-operative efforts with manufacturers looking toward improved and increased production; studies have been made of products plant design and layout, and suggested plans and other technical information are at the disposal of prospective manufacturers considering the construction of new factories as well as those who desire to improve existing plants.

As a representative technical activity, the Portland Cement Association's bureau has prepared complete codes of recommended practice for the manufacture of various concrete products and maintains active membership on various committees such as the Committee on Sewers and Drain Tile, American Society for Testing Materials and the Committee on Concrete Products, American Concrete Institute. These committees are all active agencies in the preparation of the codes and specifications under which concrete products are made and sold.

The Cement Products Bureau is at the present time actively promoting concrete block, building tile, brick, architectural trimstone, pipe, drain tile, railroad ties and a long list of other pre-cast products through the medium of a series of 18 carefully prepared booklets which will probably have a combined circulation of some 500,000 copies in 1921. Booklets explaining and illustrating "Concrete Block Garages", "Concrete Fence Posts" and "Concrete Tile for Land Drainage"

A. J. R. Curtis, manager of the Cement Products Bureau of the Portland Cement Association

are representative of the series. Concrete block houses and garages are being featured in extensive newspaper and magazine advertising of the association, arranged to reinforce the local advertising of the block manufacturers throughout the country. Inquiries received by the Cement Products Bureau as a result of advertising, gravitate into the hands of the nearest products manufacturers.

The educational work of the bureau has not only extended to the engineering, architectural and trade schools and colleges, which are training new recruits for the building industry, but have extended to include a series of 24 "Home Builders' Short Course" now being held in principal centers of concrete block manufacture in the United States for the purpose of improving both the manufacture and the methods of laying concrete block and building tile. The courses have attracted audiences of contractors, concrete block manufacturers, architects, realtors and others interested in extending the use of high-class modern concrete block in residence construction.

The manager of the Cement Products Bureau is A. J. R. Curtis, who is assisted by a corps of some 20 specialists, each devoting his entire time to specialized subjects, such as house promotion, sewer pipe promotion, investigation of the future demand for concrete railroad ties, etc. Mr. Curtis, who acted as Assistant Director of the Department of Labor's "Own Your Home" campaign in 1919 and as an assistant to the United States Senate Committee on Reconstruction during the summer of 1920, is secretary of the National Conference on Concrete House Construction and a member of the Executive Committee of the Chicago Own Your Home Exposition.

Agstone Association Grows

AT A MEETING of the Executive Committee of the National Agricultural Limestone Association, March 9, at Piqua, O., the Columbia Products Co., Cleveland, O.; the Ohio Marl Co., Dayton, O.; the Casper-Stalle Co., East St. Louis, Ill.; the Columbia Quarry Co., St. Louis, Mo., and the Canada Crushed Stone Corp., Dundas, Ont., were elected active members.

The Jaite Co., bag manufacturers, Jaite, O., and the Adams Bag Co., Cleveland, O., were elected associate members.

Invitations for the National Agricultural Limestone Association to join the Association of Natural Soil Resources and the American Society for Testing Materials were received, but no action was taken in respect to either.

The Association has also been invited to join with the National Lime Association in conducting some tests at the University of Tennessee, Knoxville. This matter was considered, but no action taken.

Harry H. Brandon, of the Ohio Marble Co., Piqua, O., presided.

Some Principles of Finance

Facts About Promotion and Financing Quarry and Gravel Plant Operations Every Business Man Should Know

ALL SOUND FINANCE should be conducted according to certain principles that are clearly defined, and disaster is sure to follow, sooner or later, any departure from these principles.

The hope of getting rich all at once, of gambling and expecting always to win and let others lose, and, in some cases, the demanding of more interest than can be properly earned, have been potent factors in causing many failures, which have created in the minds of the general public the impression that quarrying is a gamble and not a business, and that, therefore, the recognized rules of finance cannot be applied to such undertakings.

Intelligent investing in rock products enterprises requires a knowledge of business principles and a careful investigation that very few seem willing to make.

Capitalization—The methods of capitalizing business enterprises may be divided into four classes. This is only a rough grouping, and enterprises will be found that will occupy intermediate positions.

(1) Capitalization not based on value; its amount is consequently a matter of little importance. The nature of the enterprise is such that a determination of its value is impossible. An invention in its early stages is a good example. The capitalization merely serves to apportion the holding of the interested parties and is temporary in its nature. Its chief advantage lies in the fact that large incorporation expenses are avoided until some definite value has been demonstrated. Temporary organizations, when large undertakings are to be incorporated, are often capitalized in this way. The United State Steel Corp. was first organized with a capital of $3,000. This temporary company controlled all options, contracts, and properties for about six weeks. Then the main company was formed and the capital was raised to over a billion dollars.

Close corporations, in which the capital stock is held by a few persons, are frequently capitalized without regard to value. One company doing a business of over $12,000 per annum was capitalized for $6,000. Each of the three stockholders subscribed for $2,000. The United Verde Copper Co. may be considered a close corporation, as it has less than 20 stockholders. This company is capitalized for $3,000,000, and up to October, 1917, had paid over $44,000,000 in dividends.

(2) Capitalization based upon present value. The capitalization of a new enterprise, well within ordinary lines of business, is a comparatively easy matter. A man may buy a lot, build a store on it, and begin business. The cash or other property put into the business constitutes the entire value of the enterprise and measures its capitalization. If a capable manager can be secured only by the offer of some stock in addition to his salary, this stock must be added to the capitalization. In the case of a corporation formed to take over an existing business, the purchase price plus a suitable working capital and a necessary reserve make up the capitalization. Promoters often take a business at one price and sell it at another, the promoter's profit being included in the new capitalization. If a promoter's share is not excessive, such a method is legitimate.

Acknowledgment

THIS IS AN ABSTRACT of an article by Robert S. Lewis in the October 2, 1920, issue of "Mining and Scientific Press." As originally written it applied specifically to mining enterprises, but quarry, sand, gravel and similar operations are identical in character and these words have been substituted in many instances for "mining."—Editor.

What is known as "goodwill" is a factor that enters into the capitalization of going concerns. Goodwill may be defined as the profit-producing power of an established business in addition to interest and replacement returns on the investment. It is intangible, but is an asset of the business and should be included in any scheme of capitalization unless it is of such a nature that it will not remain with the business after a change of ownership. One method of valuing goodwill is as follows: The net profits are capitalized at a selected rate. If 10 per cent is determined upon, a business returning a profit of $6,000 per annum would be capitalized at $60,000. All property values are deducted from this and the remainder is the capitalized value of the goodwill. Thus, if $40,000 constitutes the value of the property, the value of the goodwill is $60,000 less $40,000, or $20,000.

In large corporations the issue of common stock is frequently based on goodwill. Preferred stock is issued to the full amount of the material assets. The dividend to be paid on this stock is deducted from the total net earnings, and the remainder, representing the earnings of goodwill, is used as the basis of the issue of common stock. For example, let the net earnings of a concern to be capitalized be $2,000,000 per annum. The value of the property is $15,000,000. Then preferred stock is issued to this amount. If seven per cent is paid on the stock, the amount of the interest, or $1,050,000, is deducted from the annual income of $2,000,000, leaving $950,000 as the basis for the issue of common stock. Assuming that five per cent will be paid on this stock the issue would then be $950,000 at five per cent, or $19,000,000. The total capitalization would be the sum of the stock-issues, or $34,000,000.

(3) Capitalization based upon future profits. In this case the profits are estimated; they are not an accomplished fact. If kept within reasonable bounds, this capitalization of profit probabilities is perfectly legitimate. The stock of a business that pays seven per cent dividends may sell at par or $100 per share, but a similar stock paying 14 per cent will not necessarily sell for $200. It is more likely to be priced at from $170 to $180 per share. If the owners are considering a future sale of stock, and believe that the increase in earnings will amount to seven per cent, it would be legitimate for them to increase the capitalization 100 per cent.

(4) Capitalization when the value of the enterprise can only be determined by development. In these cases the capitalization is fixed by more or less intelligent guesses. The actual value of the undertaking cannot be determined, so the promoters issue and sell stock for what they can get for it. It is not wrong to offer stock as a gamble provided conditions are truthfully represented. Misrepresentation of conditions constitutes the fraud in this case.

Over-Capitalization—Capitalization that is in excess of the proper needs of the enterprise has caused the failure of many a meritorious promotion. The earnings were never adequate to pay dividends on the huge capital involved. In some cases of improper management dividends were

paid that were never earned, the money being taken from paid-in capital that had been held in reserve. This point will be discussed more fully under the head of dividends.

Over-capitalization is generally due to one of four causes: First, fraudulent intent. A second cause of over-capitalization is the method of promotion. Showy offices, the payment of large commissions and salaries, and other concomitants of flashy promotion, leave little of the large capital subscribed to be used in the legitimate development of the enterprise. A third and frequent cause of excessive capitalization is over-sanguine estimates of value. Under this head would be included the cases in which the owner asks a fair price for his property but tells the promoter that he can have all the profit he can make above this price. The promoter then tries to secure such a large profit that the load imposed on the enterprise is beyond the possibility of any reasonable profit or dividend-paying possibility. A fourth cause of over-capitalization is the avarice of owners. This is similar to the preceding case. A price beyond all reason is asked for the property, and there is no possibility that any profit can be made on such a heavy investment.

Amount of Capital—The total capital required for an enterprise may be divided into two kinds; fixed capital, or that invested in plant, real estate, and equipment; and working capital in the form of raw materials, stocks of partly finished goods, finished products not sold, accounts receivable, salable securities, and cash. Fixed capital is in forms that cannot be disposed of without breaking up the business. The proportion of working capital, in terms of total capital, that is required in some lines of business is much greater than in other lines.

For crushed stone, sand, gravel and similar companies, the necessary investment in buildings and equipment can be quite satisfactorily determined. The working capital must at least be sufficient to meet the expense of development work, supplies, and payroll, until the product can be marketed. If the product of the quarry or pit can be sold within a short time, less working capital is needed than if the product must be carried for months before it can be marketed. More meritorious enterprises have failed through lack of adequate working capital than perhaps for any other reason.

A certain prospect has a promising appearance and a group of men organize a company to develop it. An estimate is made of the cost of plant and development. This capital is subscribed and work is started. The deposit had not been fully prospected, and the development work shows that the operation will be more difficult than expected. Several months of operation may be required before full production is attained. As a result, the owners have to pay assessments or become discouraged, and sell out at a loss. The property makes a successful operation in the end, but only when sufficient capital has been put into it.

Dividends—These are declared out of net profits by the board of directors. Once a dividend has been declared it becomes an obligation of the company and must be paid. Stockholders have no voice in determining the amount or time of dividends. The regular payment of dividends is desirable, and is considered an important principle of modern business finance. Most stockholders know little or nothing about the inner workings of their company. They have bought stock as an investment and a regular income is desired. For this reason well-managed companies try to maintain uniform dividends. Profits vary from year to year and regular dividends can be maintained only by placing the rate at a conservative minimum. Whenever profits are great enough to permit of increasing the dividend, an extra dividend is usually declared. This dividend is often sent as a separate check, to indicate that it is an addition to the regular dividend and may not be paid again.

It is a serious mistake for a new company to declare dividends too soon. Stockholders frequently become impatient for dividends. They have been known to bring pressure to bear on a board of directors as to force the board to declare a dividend sooner than their best judgment dictated. It takes time to develop a property to a dividend-paying basis, and no intelligent investor should agree to a distribution of dividends until it is perfectly safe for the company to pay them. This premature payment of dividends has been the cause of much financial embarrassment. The payment of dividends should depend not only upon the profits earned but upon the financial position of the company as well. Working capital is reduced by the payment of dividends, and until a company is upon a well-established financial footing any impairment of working capital is dangerous. A satisfactory cash balance should be built up and this cannot be done if profits are paid out as dividends the moment they are earned.

In some instances dividends have been paid from borrowed money. Though this is most always done for speculative purposes to keep up the price of stock, such a method is legal and may be justifiable for a company that faces wide seasonal fluctuations in earnings, but the wisdom of such a policy is open to question. Fraudulent payment of dividends out of capital has been known, but the directors are legally liable for such dividends. The payment of unearned dividends is due to ignorance on the part of the directors, or to their belief in large future profits, or to their desire to give the company a higher standing either on the stock market or with creditors than the earnings warrant.

Dividends from quarry and pit companies should be paid according to these business principles, but the investor in such stocks should recognize the fact that his dividends differ from those derived from other industrial companies. An operation of this kind is a wasting asset. The deposit is not unlimited in size and every ton of material removed lessens the reserve. When all has been taken out of that particular operation it has reached the end of its life. Dividends from a manufacturing concern may be considered wholly as income, but dividends from quarry and gravel pit companies should be considered as part income and part return of capital. If a deposit has a life of, say 15 years, enough of the dividend should be put into a sinking-fund so that it would accumulate to a sum equal to the purchase price of the shares at the end of the life of the deposit. The remainder may be used as income. Should the whole dividend be spent as income, the investor would lose the purchase price of the shares, as they would have no value when the deposit had been worked out.

In regard to the dividend-rate that should be expected from the investments in quarries and gravel pits, the principle to follow is that the rate should be proportional to the risk involved. The greater the risk, the higher should be the rate. Government bonds or money in the savings bank may receive as low as three or four per cent, because of the safety of its position. A well-established manufacturing concern may pay five or six per cent. Here, the element of risk is greater. A panic or some unforeseen contingency may cause a failure, but the danger is remote. At best, a quarry or gravel pit investment has a large element of risk attached to it and therefore the return should be proportionately great. For a proved operation that is well-managed and has large rock reserves, the rate may be comparatively low, say eight to 10 per cent. Many operators state that 10 per cent should be the very least expected. Since this is not all income, as part must be used to replace the investment, 12 to 15 per cent would compare favorably with, say seven to 10 per cent in manufacturing or other industrial enterprises.

Form of Capitalization—When the amount of capital to be raised has been determined upon, it is necessary to select the form in which it shall be raised. The common forms are stocks and bonds. Bonds are really notes or promises to pay a certain sum at a specified date.

They are usually secured both as to principal and interest by a deed of trust or a mortgage on real or personal property. Because of this safeguarding of the investment the interest-rate on bonds is comparatively low; five or six per cent is a common rate for good bonds, though at the present time the rate may be one per cent higher. In exceptional cases, where money must be raised on short notice, desirable bonds may be placed on the market at a rate as high as eight per cent.

To the promoter or organizer of an enterprise a bond is the best method of raising capital. The interest-rate on the money borrowed is low, and large earnings can be used to pay dividends on the stock of which the promoter holds a large block. The bond-buyer surrenders all chances of a high return on his investment for the great safety involved. If necessary, he can foreclose and take over the property to his own advantage. If the stockholder receives no dividends and his stock drops to almost nothing in value, he is helpless unless he can prove that the management has been dishonest. However, certain enterprises do not make a good basis for bond-issues until they are well established, and even then bonds could be issued for only a moderate percentage of the value of the property.

The capital stock of a company is the total amount that it can issue under the terms of its charter, and bears no necessary relation to the amount of stock actually issued or subscribed for. A company may have a total capital stock of $1,000,000 and yet only half might be issued, the remainder being kept for later use. The outstanding stock is $500,000, but the capital stock is always $1,000,000. Dividends are paid only on issued stock. Unissued stock represents nothing but the right to issue. If sold it brings in cash but the stock carries with it an interest in the company that should equal the price received for the stock. Thus, the increase in assets and liabilities is just equal.

Formerly the law required that all the capital stock must be issued and paid for, but now state statutes vary, and usually only part of the capital stock has to be paid up within a stated time. A share of stock represents an interest in the company, and its true worth depends only upon the earning power of the company. For this reason the face or "par" value of a share has in reality little meaning, and speaking of stock as above or below par simply means that the financial condition of the company is considered to be either good or poor. A share is worth only its proportional part of the whole corporation no matter what the par value may be. There is a growing tendency to issue stock having no par value.

The idea that unissued stock is the same as treasury stock is prevalent, but incorrect. Unissued stock is merely the privilege of creating a liability. In one state the payment of $20 will charter a company and authorize an issue of stock up to $20,000,000. Such a company would have an over-supply of unissued stock, but no assets at all. When stock has been issued and fully paid for and then comes back into the treasury of the company, either through purchase or donation, it is rightly called treasury stock and can be sold to bring in cash, for it has a definite value, yet it cannot be voted by the company nor can dividends be paid upon it.

Preferred stock is stock that is given some preference over common stock in regard to profits and often in regard to assets in case of liquidation of the company. Usually it is guaranteed as to dividends, and these dividends are cumulative, that is, if not paid when due the amount remains as a liability of the company and all preferred-stock dividends must be paid before a dividend can be declared on the common stock. It is often arranged that preferred stock is subject to redemption at a premium ranging from five to 20 per cent. A common protection for preferred stock is the requirement that the company must maintain a certain ratio of current assets to liabilities, of net surplus to capital, and of dividends to surplus. In one concern, quick or easily realizable assets must be maintained at a minimum of $140 per share of preferred stock. Additional issues of preferred stock cannot be put out at more than two-thirds the cost of improvements and the increased capital. Preferred stockholders may have a right to vote. In some cases they come into control of the board of directors if dividends are not paid when due.

Should a company earn large profits there is a possibility that the common stock might receive a larger dividend than the preferred stock, since the preferred-stock dividend is limited to a specified amount. For this reason, a provision is sometimes made that after a dividend equal to that paid on the preferred stock has been paid on the common stock, all dividends above these requirements are shared equally by the two issues. If preferred stock is made cumulative as to assets it would prevent some outside interest from buying up the low-priced common stock and electing their own directors and then selling the property of the company. Unless cumulative as to assets, the preferred stock would have to share equally with the common stock, which might have little value because of poor dividend prospects.

Promoters and Promotion — The promoter of stock companies performs a necessary and useful function in the business world. Taken in the proper sense of the word, the promoter's field is to bring together capital and an enterprise in which capital can be usefully and profitably employed. He finds the opportunity and then turns it into a reality. So many fake schemes and unfortunate promotions have been inflicted on the public that the term "promoter" is often regarded as one of reproach.

The work of the promoter may be divided into three stages: investigation, assembling and financing. When a promising discovery has been made, the promoter must make a thorough investigation of the enterprise to test its possibilities. In large projects, engineers are employed to make a detailed survey of conditions and to draw up estimates of cost. No stone should be left unturned in the effort to view the project from all angles and to weigh carefully each disadvantage. Only in this way can correct judgment be passed on the enterprise. If the final judgment is favorable, the next step is to assemble the essential elements. This means securing all rights and options, chartering the new company, forming the financial plan, and preparing to sell the securities. All this takes time, and may require the spending of a large sum of money.

Capitalists cannot be interested unless the project is in definite form. Then, for his own protection, the promoter must be secured in his title to rights and options. Instances have been known where the promoter had outlined his plan to a financier who had listened carefully but refused to supply funds, only to secure the option for himself as soon as the promoter had gone. The final step is the selling of the securities and getting the enterprise under way. To carry his work to a successful conclusion the promoter must understand his business thoroughly; he should possess tact and patience; he must have a good knowledge of men, as well as abundant energy and great perseverance. He runs large risks, and it is only fair that he be properly compensated.

Concrete Used for Railway Cars in Europe

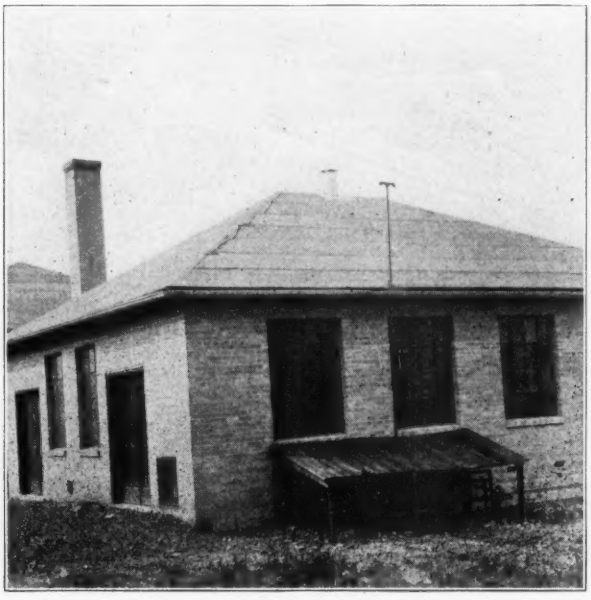
RAILWAY FREIGHT CARS are appearing in Europe made of armored concrete instead of steel plates. These cars are at least 40 per cent cheaper to build, and if the interior is not tin-plated they are 70 per cent cheaper than ordinary cars. Experimental cars of reinforced-concrete have been built in this country during the last two years and are said to be satisfactory. The Illinois Central Ry. has one or more.

Concrete Brick, Gypsum Stucco Using Limestone Screenings

A GREAT MANY CRUSHED-STONE producers are always at a loss to know what can be done with the products regarded as waste; as to what can be done to put such a product on a paying basis, by utilizing some manufacturing process which will not only eliminate the waste, but also pay dividends.

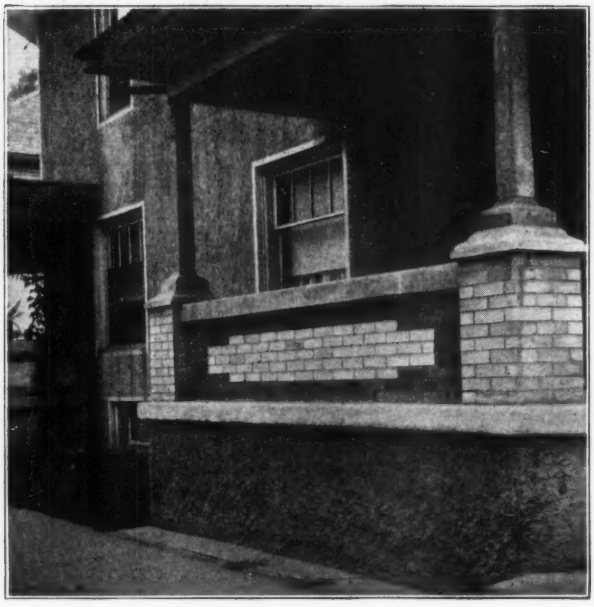
Of course, the big field for limestone quarry screenings is for agricultural purposes, but in a great number of cases more screenings are produced than are sold, and it is then put on the dump pile and regarded as waste. The problem then is to put this waste to use, and the answer is manufacture of cement brick, with limestone quarry screenings as the aggregate.

At the plant of the Ohio Marble Co., at Piqua, Ohio, a local brick manufac-



Brick company's office—common brick

Porch of face brick



Color effects with face brick

Stucco made with limestone screenings

turer has set up a small plant on the stone company's property, and is turning out brick just as fast as he can possibly make them. He buys the screenings from the Ohio Marble Co. at a very nominal price, and is therefore able to make a brick, which returns him a good profit.

J. S. Small, of the Small Brick Co., is the man who is doing this work. Mr. Small not only makes common brick, but also a face brick if desired. He claims that it will withstand any test made on any other kind of brick, and has a greater crushing strength and less absorption than clay brick. Mr. Small has also developed a stucco with limestone quarry screenings using gypsum plaster as a base, which he declares is superior to any other kind of stucco that he has ever used. He has been in the contracting business for a great number of years.

Mr. Small describes his stucco as composed of equal parts of calcined gypsum and fine limestone screenings. He mixes very small batches at a time, because, of course, it sets very quickly, and cannot be used after it has once set. It can be applied over brick, lath or any kind of surface; and he says it will not crack and weathers perfectly.

The fineness of the screenings all depends upon the brick being made. If a coarse porous brick is desired, coarse screenings may be used, and vice versa.

A. Acton Hall, president of the Ohio Marble Co., is very much interested in Mr. Small's work, and declares that it is something with a real future to it. It is a good solution as to what to do with screenings formerly regarded as waste. The pictures shown on this page illustrate several houses that were built of Mr. Small's brick.

Concrete Brick Without Forms

Brick Cut From Continuous Column of Wet Concrete Something as Clay Brick Are Made

THE LARGEST CONCRETE BRICK PLANT yet established is that of the Brooklyn Crozite Brick Corp., Brooklyn, N. Y. This plant was recently completed and has a capacity of 100,000 brick per eight-hour day, using four machines of the type illustrated herewith.

Sand and gravel are mined by the brick company on its own property with a small electric shovel. Everything over ⅜-in. in size is screened out and wasted. The raw material goes by an elevator to shaker screens, thence to a sand separator and washer, where the loam and excess of fines are removed.

The wet sand is fed to a bin over a concrete mixer. The sand and cement are measured in separate hoppers and the freshly mixed concrete is fed by gravity to the four special brick machines.

Each brick machine has an eight-foot vertical column, the cross-section of which is equal to 10 standard size brick on edge, and the length of one brick. At the foot of this column, which is kept filled with wet mixed concrete, is a forming head.

The forming head holds the material for the 10 bricks while a horizontal knife ½-in. thick cuts off the bottom of the concrete column to a proper thickness to make the brick, and nine vertical knives ⅛-in. thick attached to the horizontal knife cut the concrete mass on the form into 10 standard brick. The pallets with their loads of brick are removed mechanically from the brick machine and empty pallets are likewise returned. There are two drying kilns and a storage yard, all equipped with up-to-date material-handling appliances.

The dropping of the wet concrete in the column after the removal of the horizontal knife each time assists in making the concrete dense and removes the surplus water.

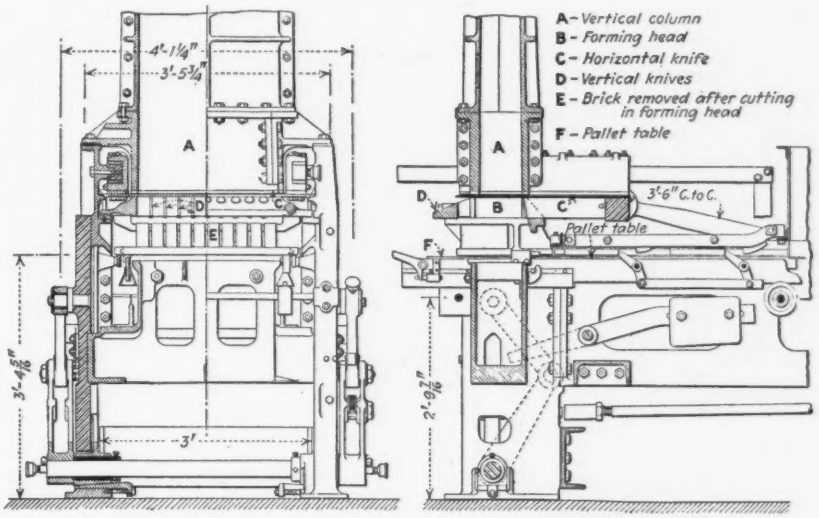
The handling of the raw materials to the point of loading the mixers, at the plant, requires the services of about four men for sand and three for cement. This is the least economical part of the operation so far as labor is concerned. One man at each mixer is required. The mixers are the batch type. The water used is about 15 per cent of the full batch weight—a wet mix.

The brick machines are automatic in operation, but require one or more attendants to see that they are working properly. One of the claims made for this process is that the brick are particularly uniform as regards strength. Tests made on common brick show 4 to 11 per cent absorption, depending on the wetness of the mix. (Clay brick have from 15 to 32 per cent absorption.)

It will be seen that the principle on which this machine works is similar to that of a clay-brick machine, and it is automatic, requiring less handling of the material than the usual type concrete brick or block machine. The machine and its use are of course controlled by patents.

Colored brick may be made by this process but the coloring matter must be diffused through the entire brick instead of being on the surface only, as in the Shope process.

The officers of the Brooklyn Crozite Brick Corp. are: President, Morton D. Hull; vice-presidents, M. M. Upson and H. O. Pond; manager, J. L. Miner. The patents cover what is known as the Crozier system of concrete-brick manufacture.



Machine for making concrete brick according to the Crozier system

Fire Tests of Concrete Columns

Complete Summary of Data Shows Limestone Makes Best Fireproof Concrete

THAT LIMESTONE AGGREGATE makes one of the best concretes for resisting damage by fire was first generally realized in 1919 when a preliminary report of the fire tests of concrete columns made by the United States Bureau of Standards was made public (ROCK PRODUCTS, July 5, 1919, p. 53). These tests are the most thorough and the widest in scope of any column tests ever undertaken. They were conducted by the Bureau of Standards, at the Pittsburgh laboratories in cooperation with the Associated Factory Mutual Fire Insurance Companies and the National Board of Fire Underwriters.

A final report of these tests has recently been published by the Underwriters' Laboratories, 207 East Ohio Street, Chicago, Ill. It comprises a book of 390 pages and is sold for $2 in paper covers and $2.50 in cloth binding. This report is, of course, intended primarily for architects and engineers, and will have a tremendous effect on design and specifications of concrete for use in building construction. The final report includes as well as the data on the concrete column tests, a description and results of tests on other kinds of columns used in building construction.

While the report is too technical and complicated for the average limestone quarryman to make much of, there are certain general statements and conclusions which are the best selling arguments that have ever fallen the way of the crushed-limestone salesman. For that reason it might be well for him to have a copy of the report for exhibit when required.

The objects of the tests included the determination of the comparative value of various concrete aggregates for use in fireproof concrete, and it is of course this feature that mostly interests the readers of ROCK PRODUCTS.

Comparative Value of Various Aggregates

Speaking of the tests of steel columns with concrete protection (p. 194), the report states:

"With a given thickness or size of covering the main cause of variation in results was the difference in fire resisting properties of concrete made with different aggregates. In this particular the concrete can be placed in three groups. That giving the most unfavorable results was the concrete made with Meramec River sand and gravel, a number of large cracks forming early in the tests followed by spalling of large and small pieces of concrete not held by the ties. This sand and gravel consists almost wholly of quartz and chert grains and pebbles, the gravel having a particularly high chert content. Both these minerals are forms of silica, the quartz being crystalline and anhydrous, and the chert amorphous with a variable amount of water in chemical combination. On being heated part of the combined water in the chert is liberated and the consequent vaporization disrupts the pebbles. Other causes of disruption of concrete made with siliceous aggregates are abrupt volume changes, points of which are known to exist for chert as low as 210 deg. C. (410 deg. F.). Quartz has a decided point of abrupt volume change at 573 deg. C. (1064 deg. F.), where it is transformed into the mineral tridymite, the change extending over a considerable temperature range when the heating is rapid. Water inclusions contained in small cavities formed when the rock is crystallized from the molten condition may be the cause of some of the cracking incident with fire exposure.

"The middle group includes concrete made with trap rock, granite, sandstone and hard coal cinder.

"In tests with trap rock and cinder concrete a small amount of cracking developed during the last part of the fire period, but no spalling of note occurred before failure. In the granite concrete protections the cracks developed earlier in the test and portions of the corners spalled off during the last 30 minutes of the test period. In the tests with sandstone concrete protections, cracking and spalling of corners outside the wire tie began in the first 30-minute period and continued during the next hour, after which there was little apparent change before failure. The spalling exposed portions of the flange edges which to some extent hastened the failure. The average time of failure in tests with sandstone concrete protections was intermediate between those with trap rock and those with cinder concrete. The cracking of the sandstone concrete after a short fire exposure can be ascribed mainly to the abrupt volume change of the constituent quartz grains as noted above.

"Fusion of the trap rock concrete occurred where the test extended beyond seven hours, the concrete being affected to a depth of about 1½ in. Flowing of the concrete due to fusion, while not general, occasionally formed pockets up to 2-in. depth. Incipient fusion to about the same depth occurred in the 4-in. granite concrete protections, although no actual flowing of concrete took place.

"The third group comprises protections of Chicago limestone concrete and Joliet gravel concrete. The composition of this gravel is similar to that of the Chicago limestone and the fire resisting properties of the concrete made with each compare quite closely. Very little cracking resulted on expose to fire and their heat insulating value was increased by the change of the calcium and magnesium carbonates to the corresponding oxides (lime). This process retarded the flow of heat through the region of change and left material of good insulating properties. Immediately after the test the surface of the concrete was firm, but after a few weeks' exposure the hydration of the oxides caused slaking and crumbling of the calcined material."

Reinforced-Concrete Columns

On page 206 it is stated: "In the reinforced-concrete columns the coarse aggregates used were Chicago limestone and New York trap rock and the application of results should be limited to columns made with these concrete aggregates. Comparisons given above on the behavior of concrete made with these and other aggregates and applied in coverings for steel columns, indicate that less favorable results would be obtained with some of them when applied in reinforced-concrete columns than was obtained with the columns tested. Also in the fire and water tests the sections of the columns made of siliceous gravel concrete developed much greater disruptive effects during the relatively short fire exposure preceding the water application than the sections made of limestone or trap rock concrete. The behavior of limestone and trap rock concrete in tests of reinforced-concrete columns was similar to that of the corresponding concrete of the (steel) column coverings, little cracking or spalling of consequence occurring before failure.

Limestone Better Than Trap

"The limestone concrete columns all withstood the 8-hour fire test and while hot sustained loads exceeding twice the load applied in the 8-hour period. The two vertically reinforced trap rock concrete columns failed after 7 hours and 23 minutes and 7 hours and 57 minutes, respectively, and the hooped column withstood the 8-hour fire test and failed under a load about 25 per cent greater than the load sustained during the fire test. A

2-in. thickness of concrete next to the surface was assumed as covering in all cases and was not included in the area used in computing working loads. The difference in results within the group can be attributed to concrete aggregate, the other incidental factors being comparable or favoring the tests giving the lower results. The trap rock concrete fused and fluxed at some points to a depth of about one inch, which undoubtedly affected the time to failure to some extent. The results obtained with the concrete of both aggregates show a high degree of fire resistance."

Comparative Merits of Various Ballast Materials

THE BALLAST COMMITTEE of the American Railway Engineering Association in its report on ballast to the annual convention at Chicago, March 15, states that the following sets forth the relative order of effectiveness of various kinds of ballast:

(1) **Stone**
  (a) Trap rock.
  (b) Limestone.
  (c) Sandstone.
(2) **Washed Gravel**
(3) **Broken Slag (not granulated)**
  (a) Precious metal slag.
  (b) Open-hearth slag.
  (c) Blast furnace slag.
(4) **Screened Gravel**
(5) **Pit Run Gravel**
  (a) River or stream gravel.
  (b) Hill gravel (not cementing).
  (c) Hill gravel (cementing).
(6) **Chats**
  (a) Chats from zinc ore, which is coarse.
  (b) Chats from lead ore, which is fine.
(7) **Burnt Clay or Gumbo**
(8) **Cinders**
  (a) Hard coal cinders.
  (b) Volcanic cinders.
  (c) Soft coal cinders.

All That Grits Is Not Gravel!

MATERIAL RESOURCE SURVEYS for road-building material have been made in 56 counties and undeveloped deposits thoroughly investigated and examined in 24 of the counties, says a recent "Bulletin" of the Iowa State Highway Commission. The report continues:

"An interesting fact to note in this connection is that an important part of the work of this department in 1920 was quite contrary to the original purpose of the department resulting in actually discovering and proving that several well-known and very large deposits of material were absolutely worthless as road-building materials. The great gravel deposits in Greene County, near Grand Junction, where Greene County planned to equip an extensive gravel cleaning and screening plant, was found to contain a certain type of shale which could not be screened out and which would actually destroy any pavement in which it was used."

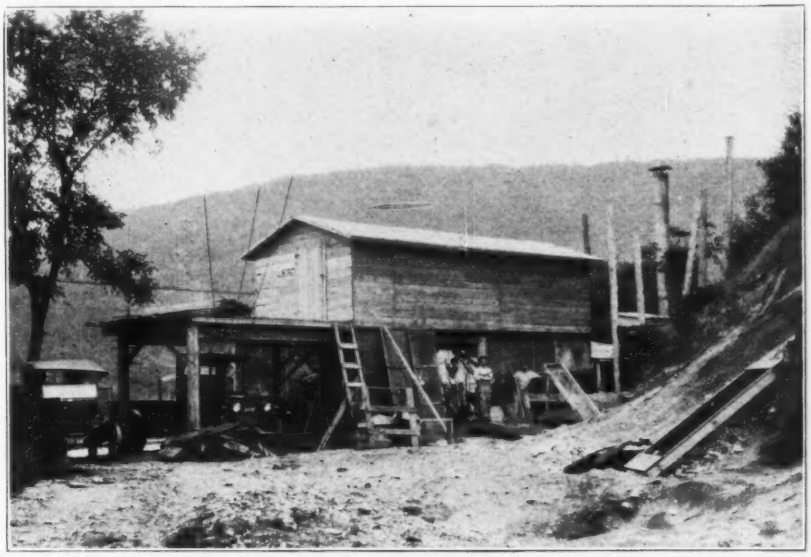
Simplicity of a Concrete-Brick Manufacturing Plant

Small Amount of Space and Little Equipment Required to Make a Beginning

THE VIEWS HEREWITH, illustrating a typical small-city concrete-brick making plant, give a better idea of the simplicity of the operation than words could possibly convey. They show how little space is required, how little is the necessary equipment and how small the minimum operating force may be.

This particular plant has a fine deposit of sand and gravel right behind it, but the manufacture of concrete brick has preceded the commercial development of the deposit. Ordinarily of course the conditions would be reversed and the concrete-brick plant would be an adjunct of the commercial sand and gravel plant, in which case many of the operations would be simplified, as discussed further on.

At the plant illustrated the sand is dug with a shovel, screened by hand, and



Concrete brick-manufacturing plant in New England

Sand and gravel excavation and screening by hand

shoveled by hand into the hopper feeding the mixer. This is one man's job, and is probably the limiting factor in this plant's output. Another man feeds the pug-mill type of mixer. A third man operates the brick machine and a fourth removes the pallets and stacks the finished brick. At the time the pictures were taken the brick were cured in air, but the sheds shown in the rear are intended for steam curing.

The rehandling of the brick for loading would require the services of another man; in this case the loading is done by the chauffeur of the truck used to make deliveries, but this might not be possible in some places, or it may not be desirable.

Six men at $4 per day is $24, or it takes 1500 brick per day at $18 per 1000 to pay the labor operating cost. Possibly an industrious crew could turn out 5000 common brick per day as a general average, which at $18 per 1000 delivered leaves $54 per day for cement, interest on investment, overhead (including a small amount of power), maintenance of the motor truck, etc.

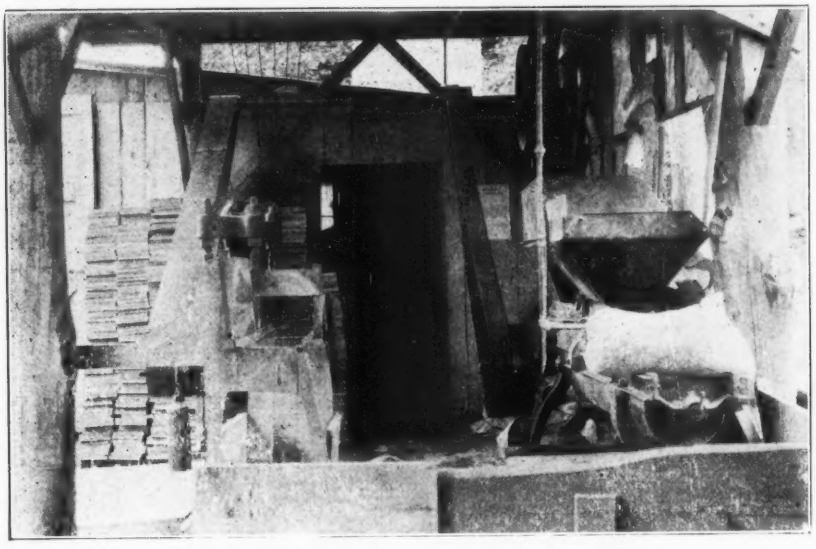
The sum of $10,000 ought to more than cover the investment, including real estate and a light motor truck. Seven per cent on this for interest is $700 per year, or, say, $3 per working day. Depreciation, depletion, etc., on the entire plant at 10 per cent would be $1000 per year, or, roughly, $5 per working day. Cement, we will say at $3 per bbl. (13 bbls.) amounts to $40, which leaves only about $15 per day for overhead (including power) and profit.

This same operation as an adjunct of a sand and gravel plant, however, would eliminate at once the man shoveling and screening sand. This would increase the capacity of the plant by probably 50 per cent. The sand could be taken direct from one or more of the plant's bins by a conveyor. A going commercial sand and gravel plant would not have to add much for overhead to take care of the sale of 1,000,000 brick a year, consequently it would seem that such an operation should show a reasonable profit, even with the very conservative figures taken in the foregoing.

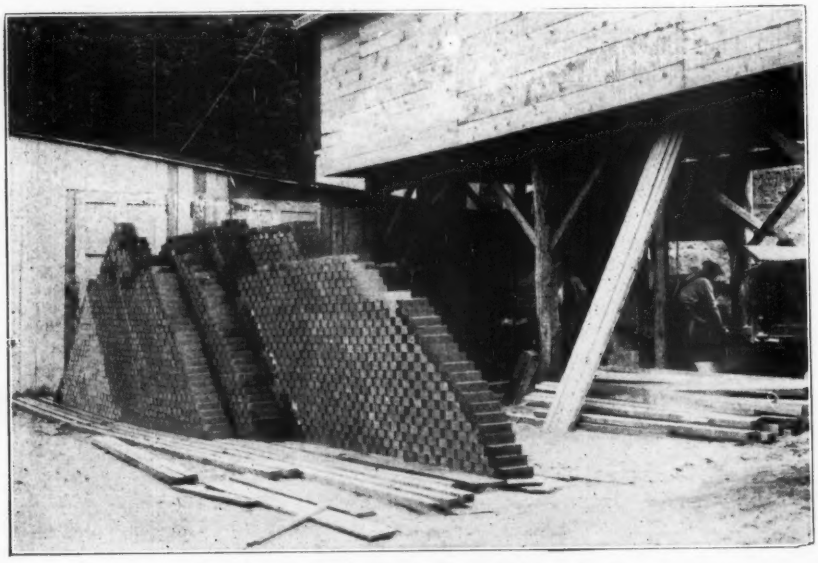
As an adjunct of a commercial sand and gravel or quarry plant, such an operation would have the advantage of furnishing an occupation to a small crew of men, who would be available for emergency work in the sand and gravel or crushed-stone end of the business in times of extra large demand, or vice versa, the brick plant would furnish employment to the sand and gravel plant employes during dull periods.

It is obvious, of course, that there is not a big profit in a small operation of this kind. Like the business of producing every other low-priced commodity, there must be quantity production to make it profitable, for with quantity production the output per man would rise rapidly, as many labor-saving devices could be added.

However, the concrete-brick business has advantages possessed by very few other building-material lines. A producer can start with a small investment, a small demand for the product and a correspondingly small output and increase his production with a minimum expenditure of new capital as the business is built up. If he starts with a well-planned first unit he may double and triple or quadruple his output and still preserve all the efficiency in production that would have been attained in building the larger plant originally. Few industries offer this same opportunity of experimenting on a small scale with a plant that can be built on efficient commercial lines.



Brick machine on left—concrete mixer on right



Finished brick, showing curing shed in the rear

Freight Rates on Crushed Gypsum Rock

RATES ON CRUSHED GYPSUM ROCK from producing points in Oklahoma to Cape Girardeau were found unduly prejudicial in No. 11129, Cape Girardeau Portland Cement Co. vs. Chicago, Rock Island & Pacific et al., Opinion No. 6628, 60 I. C. C. 269-71, but not unreasonable. Therefore, reparation was denied. The rates attacked were 15 cents prior to June 25, 1918, and 16 cents thereafter on traffic from 15 or 16 points of origin in Oklahoma of which Muskogee and Roman Nose are typical, to Cape Girardeau. The Interstate Commerce Commission held them unduly prejudicial to the extent that they were, are and for the future will be unduly prejudicial to the extent that they exceed the rates to either Hannibal or St. Louis.—"Traffic World."

Specifications for Stone Ballast

Specifications Prepared by the Committee on Ballast, American Railway Engineering Association, Are Adopted by 1921 Convention

TENTATIVE STANDARD SPECIFICATIONS for crushed-stone ballast were reported in the March 27, 1920, issue of ROCK PRODUCTS, pages 29 and 30. Since then the committee on ballast of the American Railway Engineering Association has revised these specifications. They were offered at the 1921 convention in Chicago, March 15, and were adopted. These revised specifications are as follows:

Tests—Weight—Not less than one-half cubic feet of the stone accurately measured, and dried for not less than 12 hours in dry air at a temperature of between 125 and 140 degrees Fahrenheit shall be weighed. A high quality stone is considered to be one weighing 168 pounds per cubic foot.

Strength—Two-inch cubes of the stone shall be sawed to reasonably accurate dimensions and the top and bottom faces made accurately parallel. For the primary tests, the test specimens shall be dried for two hours in dry air at a temperature of between 120 and 140 degrees Fahrenheit and at the time of the test the temperature of the specimen shall be not less than 50 degrees.

A high quality stone is considered as testing 10,000 pounds per square inch.

Solubility—One-fourth cubic foot of the rock shall be crushed and thoroughly washed. The particles shall then be placed in a glass vessel and covered with clear water. The vessel shall be thoroughly shaken for five-minute periods at 12-hour intervals for 48 hours. If any discoloration of the water occurs, the rock shall be deemed soluble and undesirable for use as ballast.

Wear or Durability—(Test No. 1)—One-half cubic yard of washed stone, which will pass through the maximum and be retained on the minimum screen, shall be spread over a wire mesh or iron surface to a depth of not more than 3 inches and exposed to a dry heat of from 125 to 140 degrees Fahrenheit for a period of two hours. After the dried stone is carefully weighed, it shall be given 10,000 revolutions in a tumbler approximately four feet in diameter, of not less than two cubic yards capacity and operating at 25 revolutions per minute.

The sample shall then be passed over a screen of the minimum dimension provided for sizing the ballast, again washed and dried in the same manner as before the test, and again carefully weighed.

Test No. 2 (Quick Weathering Test)—One-half cubic yard of stone shall be dried and weighed as for Test No. 1. It shall then be immersed in water for six hours and then while still wet, be placed in a refrigerating plant and subjected to a temperature of approximately zero Fahrenheit for two hours. It shall then be removed and the temperature gradually raised in two hours to 100 degrees and that heat continued for two hours, when it shall be immersed as before and again subjected to approximately zero temperature.

The freezing and thawing shall be repeated to a total of ten exposures. If any tendency to disintegrate is observable the stone should be considered unsuitable for ballast.

A high quality stone for ballast will not show a decrease in fragments which will pass the minimum sizing screen of more than four per cent.

Absorption—One-half cubic yard of washed stone, which will pass through the maximum and be retained on the minimum screen, shall be spread over a wire mesh or iron surface to a depth of not more than three inches and exposed to a dry heat of from 125 to 140 degrees Fahrenheit for a period of six hours. After the dried stone is carefully weighed, it shall be submerged in clean water for a period of 96 hours. It shall then be removed from water and exposed to normal air in the shade and at a temperature between 40 and 80 degrees, and allowed to drip for 30 minutes, when it shall again be weighed and the difference in weight shall be used to determine the rate of absorption.

A high quality stone for ballast will have an absorption of not more than 0.50 pounds per cubic foot.

Cementing Quality—A five-pound sample of the rock thoroughly washed and dried shall be crushed until it will pass through a screen of one-fourth inch mesh. This material shall be placed in a ball mill which contains two steel shot weighing 20 pounds each and the mill revolved at the rate of 30 revolutions per minute, until it has made 2,000 revolutions for each pound of sample in the mill.

Sufficient clean water shall be added to make a consistent mortar, which shall be moulded into one-inch cubical briquettes, formed under 10-pound pressure. All of the briquettes shall then be allowed to dry 20 hours in air, when one-third of them shall be tested for compressive strength.

One-third shall be kept for four hours in a steam bath and the remainder shall be immersed for four hours in clean water at a temperature between 50 and 60 degrees Fahrenheit, and then tested for compressive strength.

If in any of these tests a compressive strength greater than ..... pounds per square inch is developed, the material shall be deemed unsuitable for ballast.

Of the stone available, that from which the briquettes show the minimum strength should be used; a high quality stone will show not to exceed four pounds per square inch.

Requirements — Breaking — Stone for ballast shall be broken into fragments which range with fair uniformity between the size which will in any position pass through a two and a half-inch ring and the size which will not pass through a one-half inch ring.

Test for Size (Maximum)—A sample weighing not less than 150 pounds shall be taken from the ballast as loaded in the cars and placed in or on a screen having round holes two and three-quarters inches in diameter. If a thorough agitation of the screen fails to pass through the screen 95 per cent of the fragments, as determined by weight, the output from the plant shall be rejected until the fault has been corrected.

Minimum—A sample weighing not less than 150 pounds shall be taken from the ballast as loaded in the cars, weighed carefully and placed in or on a suitable screen having round holes one-half inch in diameter. The screen shall then be agitated until all fragments which will pass through the screen have been eliminated. The fragments retained in the screen shall then be weighed and if the weight is less than 95 per cent of the original weight of the sample the output of the plant shall be rejected until the fault is corrected.

Handling — Broken stone for ballast must be delivered from the screens directly to the cars or to clean bins provided for the storage of the output of the crusher. Ballast must be loaded into cars which are in good order and tight enough to prevent leakage and waste of material and are clean and free from sand, dirt, rubbish or any other substance which would foul or damage the ballast material.

New Shope Concrete Brick Plant Milwaukee, Wisconsin

Face and Mantel Brick a Specialty

THE SUCCESS of concrete brick made by the Shope Brick Co. in Portland, Ore., was described at some length in ROCK PRODUCTS, June 19, 1920. Since then plants to manufacture these brick have been established in several parts of the country, a typical one being that at Milwaukee, built by the Shope Brick Co. of Wisconsin.

This company owns the rights of manufacture for this brick in several counties of the state and has recently completed a $35,000 plant. The plant is a one-story affair, 100 ft. x 46 ft., including boiler room and kiln rooms, and is built of concrete and concrete brick. The plant is equipped with 20 hand-tamping machines and has a capacity of 70,000 common brick per day and 35,000 face brick. The company owns 5½ acres of land and has a siding on the Chicago, Milwaukee and St. Paul R. R. The kiln rooms are 22 ft. x 46 ft. each, equipped with heating coils and radiators. The heating coils are perforated and run in a groove filled with water along the sides of the kilns. In this way enough moisture is created for absorption by the brick during the curing process.

The various views accompanying this article show the sand storage, which is 30 ft. x 100 ft. running along the side of the plant. The sand from the storage is wheeled to a hopper which feeds it onto a belt conveyor leading to a concrete mixer. The cement is fed into a hopper located just above the sand hopper, and the correct proportion of each material is fed onto the belt which discharges into the mixer. After thorough mixing (water being added during the process), the material from the mixer is emptied into a wheelbarrow and carted over a central platform to the bins alongside of each machine. One man and a helper at the mixer takes care of the entire 20 machines. The accompanying views show the type of machines, mixer and bins.

The man at the tamping machine takes the material from the bin at his side and fills the molds. The brick are made face up in this machine. After the brick are tamped, the surplus material is struck off and the face of the brick sprinkled with water and a little neat cement. This suffices for the common brick. In the face brick process, coloring matter is sifted on the face of the brick, which is flushed with water. The fresh material is agitated so as to obtain a perfect bond with the body of the brick. Many different designs of facing may be obtained, such as stippled, moss, tapestry, smooth or rough. The coloring process is carried out through the use of mineral pigments.

After the brick have been "slicked" they are put on a board or pallet supplied with brackets, by a rack and pinion arrangement on the machine. This board has a metal top and is inserted as a bottom-plate before the brick are made. The brick are tamped on this board and after coloring and all have been applied, the partitions between the brick are slipped out of place by means of the rack and pinion arrangement. The construction of the board allows the storage of one batch of brick over the other. The brick are then trucked away to the kilns for curing, which requires from 6 to 8 hours, and they are then air cured for about two weeks.

The officers of Shope Brick Co. of

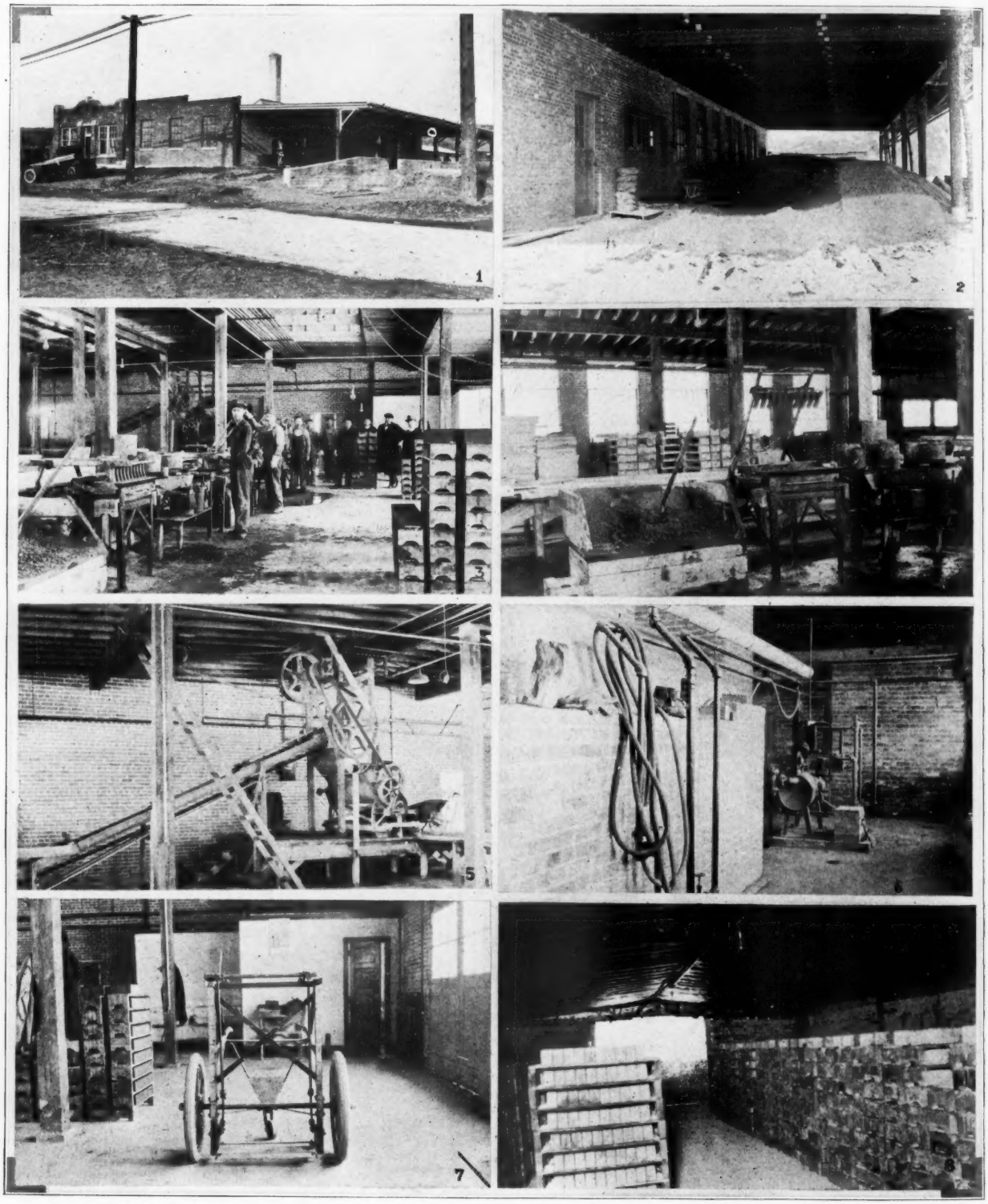
Example of concrete brick and tile made by the Shope process

Typical example of concrete face brick made by the Shope process

White matt smooth face concrete brick for store building

Wisconsin are Michael Schmidt, president; J. J. Tadych, vice-president, and P. J. Schulteis, secretary and treasurer. J. S. Barber, as general agent of the Shope Brick Co., Portland, Ore., promoted the company and was its first secretary and general manager.

The plant has been in successful operation for about four months and has turned out over a million brick. These are meeting with high favor by the architects and builders of Milwaukee.



1—Plant. 2—Sand storage. 3—Brick presses, sand-cement conveyor to Blystone mixer in the rear. 4—Brick-making outfit. 5—Conveyor to mixer. Boiler room showing automatic feed water heater. 7—Special trucks for handling brick to kiln room. 8—Kiln room for curing brick

Use of Silica and Other Mineral Fillers in Paints

III—Economics of Painting—How and Why Silica and Other Mineral Inerts Are Used as Extenders With Colors

By F. P. Ingalls

Chemist, John Masury & Son, Manufacturers of Paints and Varnishes, Brooklyn, N. Y.

PAINT MADE from iron oxide and carrying 50 per cent total pigment would have, on the basis described in the preceding article of this series for compounding standard "old English 3 Crown Venetian Red", a complete composition of 19 per cent oxide, 31 per cent inert (calcium sulphate), and 50 per cent vehicle. At the same spreading rate as before the actual amount of oxide is only 1.6 pounds per 1,000 square feet with the same complete hiding power and approximately the same durability as if the straight oxide were used (6.5 pounds of oxide per 1,000 square feet). Let it be borne in mind also that to secure maximum durability in any paint, at least two and generally three coats are required if applied at any such spreading rate as 1,400 feet per gallon; at this rate, the coat is only a little over one one-thousandth of an inch thick and to get the best durability any given linseed oil paint can furnish, the total thickness of the applied coats should be from four to five-thousandths at least.

It is quite clear therefore that with three coats of even 40 per cent oxide paint we are wasting the expensive oxide in all after the first coat (and some even in that) provided hiding power alone were the only condition to be met. To make this waste ten or twelve times as great by using straight oxide would be the height of extravagance unless some corresponding gain in service value can be shown, and long experience shows nothing of the sort.

Reason for Using Dead-Burnt Gypsum

The reason calcium sulphate is especially useful in this particular case goes back to the method of manufacture of the Venetian Red. When lime and copperas (Ferrous sulphate) are mixed and calcined at a red heat in the air, there takes place a chemical interchange which results in the formation of Iron oxide and Calicum sulphate. If the proportion of lime is just sufficient to take up all the acid, the product contains one molecule of Fe_2O_3 to two of $CaSO_4$, or 37 and a fraction per cent of oxide. Another feature is that the $CaSO_4$ is "dead burnt" and therefore has properties different from both gypsum and plaster of paris, in that it will not take up water and "set" nor give off water under heat. Quite clearly a Venetian Red of this sort is a most logical pigment and more than strong enough in oxide to meet economically the most exigent demands of all kinds of first-class general painting.

Let us suppose however that, instead of a nice smooth surface, we have to paint rough, unplaned lumber such as is found in barns, out-buildings, fence rails, and the like. On such a surface the spreading rate drops from 1,400 to four, three, or even sometimes 200 sq. ft. per gal. The porous wood sucks the oil out of the first coat causing it to dry flat, and a second coat is necessary to get a proper finish. Now although the spreading rate of the second coat may rise to 800 sq. ft. it is perfectly clear that the combined thickness of two such coats is greater than several coats on a smooth surface, and consequently the amount of oxide on a unit area is much greater than it need be. As a matter of fact the proportion of oxide may be as low as 10 per cent without any evident effect on the hiding power, and where the total thickness is as great as in these two heavy coats, the durability is at least satisfactorily good even though a larger proportion of oxide would indeed increase it in thinner coats.

If, owing to excessive wear and tear from mechanical causes, separate from ordinary atmospheric attack, repainting must be done more frequently than usual, the question of durability becomes secondary. If also the paint is applied by spraying where there is a considerable waste, the initial cost becomes more important as an economy factor. This is the usual case in freight car painting.

Why Silica Is Most Used

In the two latter cases, starting with a 40 per cent oxide, we see that the reduction may be carried down to nearly 10 per cent without obvious loss of economy to the consumer, under the conditions of use, and for this further reduction (or for the whole reduction where the starting point is pure oxide) silica is as good an inert extender as any other so far as is definitely known. Consequently whether silica is chosen in preference to some of the other inerts is more often determined by the cost at the place where the paint is being made. There are other considerations of course, such as fineness, uniformity, constancy of supply, commercial terms, etc., which are beyond discussion here; suffice it to say that cost is the dominant factor, despite the many and often ill-founded claims to special paint virtues put forth by the sellers of the dry pigment. In the case of most inerts also the cost per pound is indicative of the cost in gallons because, with the exception of barytes, the specific gravities of all the common ones are of the same order of magnitude, ranging from about 2.6 to 2.9.

This last statement may need a little explanation. Dry pigments are marketed by weight; paint formulas and compositions are discussed in percentages by weight; but all paints are applied by volume (sq. ft. per gal.), and ready-mixed paints are purchased by volume (gals.) irrespective of actual weight. In calculating costs therefore it is necessary to know how many gallons of product are yielded by a given weight of pigment, and this is readily done if the specific gravity is known, the volume being proportional inversely. Pigments having the same specific gravity yield the same number of gallons per unit weight. (For further information and list of specific gravities of many of the common pigments, see Circular 104, issued at the request of the Cost Accounting Committee of the Paint Manufacturers' Association, by H. A. Gardner of the Institute of Industrial Research, Washington, D. C.)

We are now in position to understand that even extreme reduction by inert may not be necessarily excessive under certain conditions of use, and the full meaning of our earlier statement (that the limit of economical reduction is determined by the hiding power of the colored pigments present, together with a due regard for the other physical requirements of the paint coat) becomes perfectly clear.

Causes of Paint Failures

A little consideration of the cases cited

shows that very little is to be gained in cost by carrying the reduction to the limit. Up to a certain point cost may be advantageously lowered by saving costly pigment, but beyond this point the gain is too small to be worth while. Anything further must come out of the vehicle, and it is right here that nearly all actual paint failures begin. So long as the vehicle is good linseed oil, or any sound combination of good materials compounded to meet the requirements, either as to character of finish or method of application, there will be little or no trouble. When the vehicle is stuffed with emulsified oil and water, cheap benzine—rosin drier, mineral oil, or any of the "solutions," "dopes," and "reducing oils" which are merely cheap, the paint is not good no matter what pigment is used.

With a sound vehicle there are just two causes which lead to unsatisfactory results; either the paint is improperly applied, as to time, surface, conditions, or workmanship, or else the wrong paint has been selected for the job in hand. These statements are not too sweeping, for be it remembered that the paint manufacturer has at his disposal some 200 or more different pigments and out of these makes more than a dozen different types of paint, such as Exterior Paints, Flat Wall Paints, Interior Gloss Paints, Enamels, Carriage and Automobile Gloss Colors, Heavy Paste Paints, Fillers, Surfacers, Rough Stuffs, Oil Colors, Japan Colors, Artists' Tube Colors, etc., etc.; all first class and of highest service value. These pigments, although highly variable in chemical composition and character, are used almost indiscriminately in nearly all these different types of paint, and the fundamental difference in these types depends almost wholly upon the character of the vehicle. So long as the pigment shows little or no reactivity with the vehicle there is no real obstacle to making it into any of these different types. The chemical composition of the inert therefore, so long as it *is* inert, is of no great importance, and paint failures in service are not due to its presence except in so far as it may, by its excessive quantity, impair either the favorable influence or the hiding power of the colored pigment beyond the economical limit under the conditions of use.

(To be continued.)

Errata

THE FOLLOWING corrections to the description of the Washington Building Supply Co.'s plant on page 25 of our March 12 issue are acknowledged from Arnold & Weigel, Woodville, Ohio: Analysis of the limestone should have been 53.51 per cent calcium carbonate and 45.79 per cent magnesium carbonate. The capacity of the Arnold kilns should have been 14 tons per 24-hr. day.

All Canadian Rock Products Industries Prosperous

Lime and Gypsum Industries Particularly Show Big Gains—Sand-Lime Brick Production Doubled

GYPSUM PRODUCTION in Canada has exhibited a substantial gain in 1920, the value of the shipments of crude, crushed or calcined product being greater than in any previous year and the tonnage the highest since 1915. The total quantity of gypsum rock quarried in 1920 was 460,354 tons, of which 148,964 tons were calcined. The shipments of all grades totaled 429,144 tons, valued at $1,876,595, and included: Lump gypsum, 262,442 tons, valued at $439,762; crushed, 48,379 tons, valued at $146,947; fine ground, 6,615 tons, valued at $46,584, and calcined, 111,708 tons, valued at $1,243,302.

By provinces the shipments were: Nova Scotia, 260,661 tons, valued at $556,356; New Brunswick, 49,405 tons, valued at $428,183; Ontario, 74,707 tons, valued at $404,162, and Manitoba, 45,371 tons, valued at $487,894.

In 1919 the quantity of gypsum rock quarried was 303,998 tons of which 121,496 tons were calcined. The shipments included: Lump, 172,781 tons, valued at $206,858; crushed, 27,939 tons, valued at $68,002; fine ground, 3,842 tons, valued at $18,901; calcined, 94,501 tons, valued at $921,526, or a total of 299,063 tons, valued at $1,215,287.

The exports of crude gypsum were: 244,428 tons, valued at $413,522; gypsum ground, plaster of paris, etc., valued at $232,736. The corresponding exports in 1919 were: Crude gypsum, 148,394 tons, valued at $199,857, and gypsum ground, etc., valued at $140,235.

The imports of gypsum of all grades during 1920 were: 5,234 tons, $78,302, and included: Crude gypsum, 2,294 tons, valued at $25,477; gypsum ground, etc., 118 tons, valued at $3,966, and plaster of paris, 2,822 tons, valued at $48,859. The imports in 1919 totaled 2,848 tons, valued at $47,455.

Structural Materials

During the war building activity was reduced to a minimum and the total value of the production of cement, lime and quarry products which had reached a maximum of $30,809,752 in 1913 had fallen to $17,467,186 in 1916, increasing to $27,421,510 in 1919.

In 1920 the value of this production had increased to a new maximum of $38,184,848. While higher prices have played an important part in this increase of over 39 per cent in value the actual quantities of cement, brick, lime and stone produced has been considerably increased in 1920 over the 1919 production.

Cement—The total quantity of cement sold from Canadian mills in 1920 was 6,651,980 barrels, valued at $14,798,070, or an average of $2.22 per barrel, as compared with sales in 1919 of 4,995,257 barrels, valued at $9,802,433, or an average of $1.96 per barrel, showing an increase in quantity of 1,656,723 barrels, or 33 per cent, and an increase in total value of $4,995,637, or 51 per cent.

The total quantity of cement made in 1920 was 6,498,550 barrels as compared with 4,613,588 barrels made in 1919, an increase of 1,884,962 barrels, or 40.8 per cent.

Stocks of cement on hand January 1, 1920, were 1,089,603, and at the end of December this had been reduced to 936,173.

The exports of cement in 1920 were valued at $2,193,626 as against exports in 1919, valued at $465,954. In 1919 the value of cement exports greatly exceeded the imports for the first time. In 1920 the quantity is not reported for the first three months, but is given as 2,701,584 cwt. for the last nine months. At the average price of 74 cents per cwt. given for the last nine months the estimated quantity exported during 1920 would be 2,964,360 cwt., or 846,960 barrels of 350 pounds each.

The total imports of cement in 1920 were 115,370 cwt., equivalent to 32,963 barrels of 350 pounds each, valued at $112,466; or an average of $3.41 per barrel, as compared with imports of 14,066 barrels, valued at $51,314, or an average of $3.65 per barrel in 1919.

The total consumption of cement in 1920 was therefore about 5,837,983 barrels, as compared with a consumption of 4,776,346 barrels in 1919, an increase of 1,061,637 barrels, or 22 per cent.

Lime—Sales estimated at 9,355,797 bushels, valued at 3,748,463, an increase of 31 per cent in quantity and over 62 per cent in total value. Nine firms reported sales of 35,869 tons hydrated lime, valued at $481,878, included in above.

Sand-Lime Brick—Sales reported at 46,102 thousand brick, valued at $718,735, nearly double the quantity and total value of 1919.

Stone Quarries—Value of production is estimated at $5,163,449, as compared with $4,225,937 in 1919.

Acme of Crushed-Stone Products

Artificial Stone Made from Crushed White Dolomite and Portland Cement Competes With Finest Cut Stone in Discriminating New York City Market —Plant of the Benedict Stone Corporation, Tuckahoe, New York

THERE IS A BELT of pure white crystalline dolomite that extends down the east side of the Hudson River Valley to the very borders of New York City. This dolomite is quarried in a number of places for both lime and building stone, but possibly nowhere else is it put to such an interesting use as at Tuckahoe, N. Y., where the plant of the Benedict Stone Corporation is located.

At this plant possibly the perfection of the artificial stone industry of America has been reached, for the product turned out here cannot be distinguished from the finest cut limestone or granite except by an expert. The principal ingredients are crushed and pulverized dolomite and portland cement, other materials being also incorporated in the concrete where particular effects are desired.

Crushing Plant

This plant has not yet found it necessary to operate a quarry, for close by is an abandoned cut-stone quarry, where chips and waste blocks are gathered up, loaded on dump carts and conveyed to the crusher house. The crusher is located at one end of a long shed. This shed is located parallel to the ridge of dolomite so that the level of the crusher opening is considerably above the floor level of the shed.

A modest size gyratory crusher (about No. 5) is used for a primary breaker. The output of this crusher goes to a pair of smooth-faced rolls which reduce all the material to ⅜-in. size and smaller. The very fine dust is screened out, leaving clean, white crystals of dolomite, from the size of ordinary concrete sand to the ⅜-in. stuff.

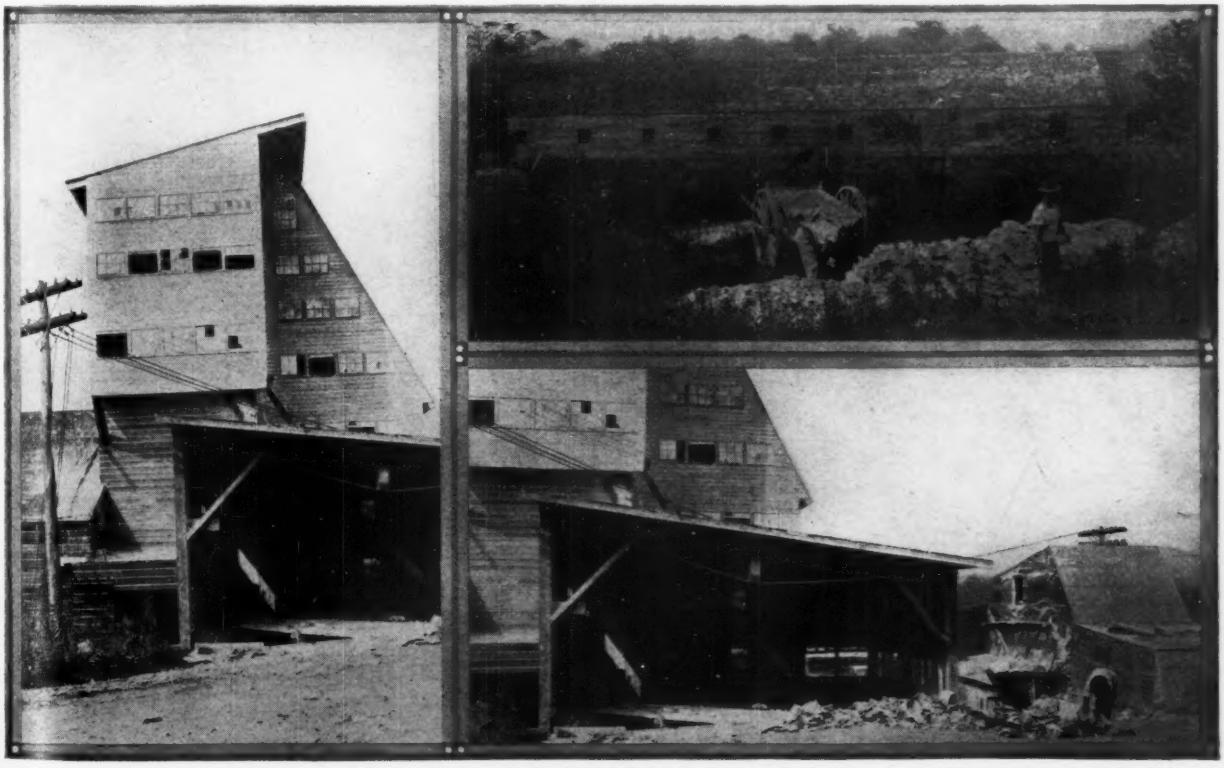
This crusher sand and the coarser aggregate are separated out from the fine dust by means of Newago screens and the stone aggregates are stored in separate bins. They are taken from these bins in weighed batches into a bottom dump steel car. To the proper mixture of fine and coarse aggregate, proportioned to give the densest concrete, is added the correct proportion of the portland cement, and the car is then run over the hopper of a batch concrete mixer, mounted on a platform at one end of the stone shed.

Sufficient water is added to the mix in the mixer to make a rather wet concrete, for the material must be of a consistency that will flow freely. Neither time nor trouble is spared to get the very best proportions possible and a most thorough mixing.

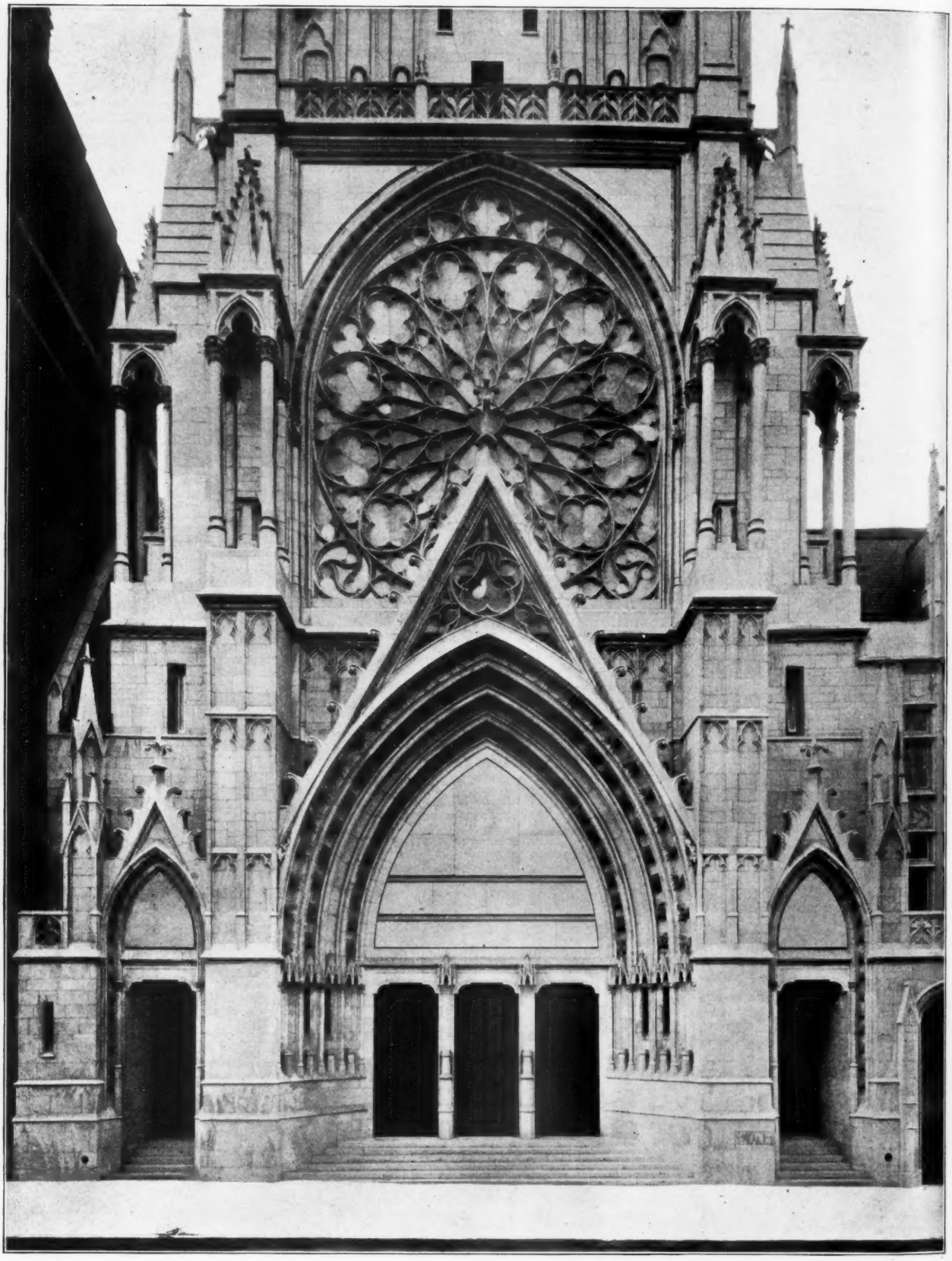
Pouring the Molds

The shed, or rather that part of it nearest the concrete mixer, resembles a foundry more than anything else. The side walls support the track for traveling cranes which span the entire width of the structure. These cranes serve the double purpose of carrying the bucket or ladle of concrete mixture and of handling the blocks after they are cast.

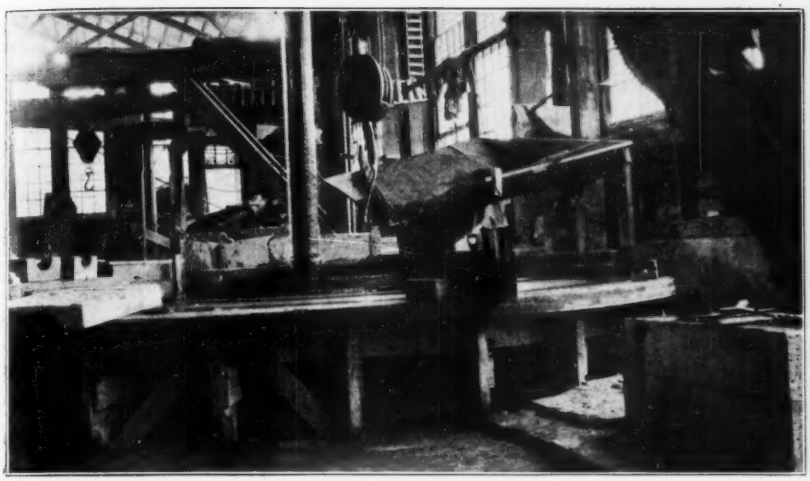
The molds are made of a special foundry sand on the floor of the "foundry," just as in making iron or steel castings. The molds are formed from wooden patterns, and in connection with the plant



Crushing plant of the Benedict Stone Corporation and the source of the raw material for "cut cast stone"



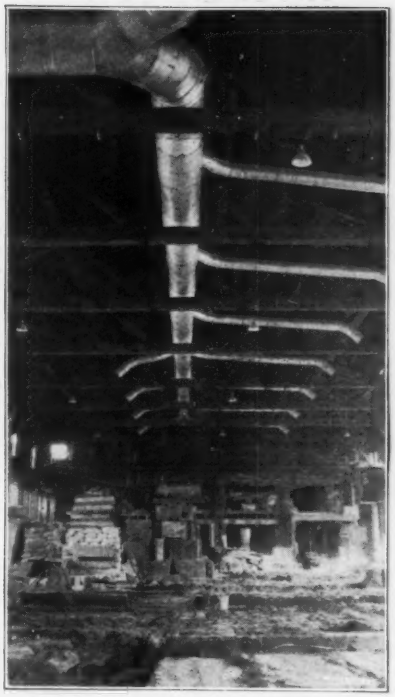
Church of the Blessed Sacrament, 71st Street, near Broadway, New York City, showing recent example of what can be done with "concrete block"



Stone polishing and finishing machine

Lower end of shed showing addition under construction

Finished material stored in yard ready for shipment



Overhead system of air-conditioning

there is a large carpenter and pattern shop employing a score or more of woodworkers and pattern-makers.

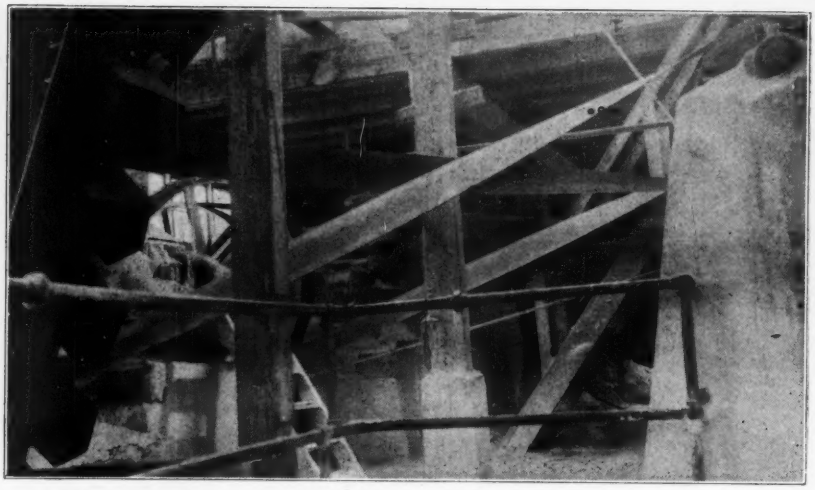
When the molds are ready to pour, the crane bucket, holding about ¾ yd. of concrete mixture, is brought by the cranesman to a point near one corner of the mold, and a valve in the bottom of the bucket or ladle is opened, allowing the mixture to flow out in a good-sized stream. To break the force of the stream and prevent injury to the sand mold, the mix is distributed by means of a short trough held by one of the casters, and a baffle is sometimes held in front of the stream to further check its velocity. The mixture is sufficiently fluid to run into and fill level every part of the mold.

The crane bucket or ladle is a special device with an electric motor mounted at one end, which is directly connected through speed-reducing gears to a revolving paddle. The ladle is thus in itself a kind of pug-mill mixer which further mixes the concrete and keeps it agitated until it is poured into the mold. There is no separation of cement and aggregates such as one frequently sees on ordinary construction work where a concrete mixture as wet as this is used.

Drainage and Air Conditioning

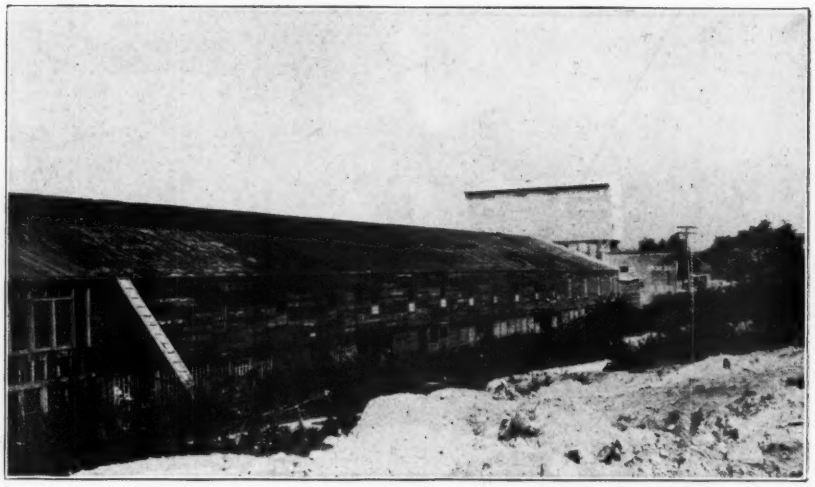
The floor of the casting shed is sand, thoroughly provided with under-drainage, so that it is never wet. The excess of water in the concrete mix is speedily absorbed by the sand molds, leaving a dense hard concrete.

The "castings" are taken out of the molds (or rather the molds are broken



Battery of roll crushers making dolomite aggregate

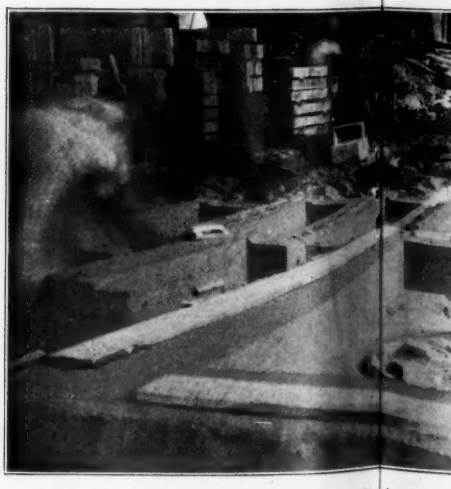
Interior view of shed showing concr



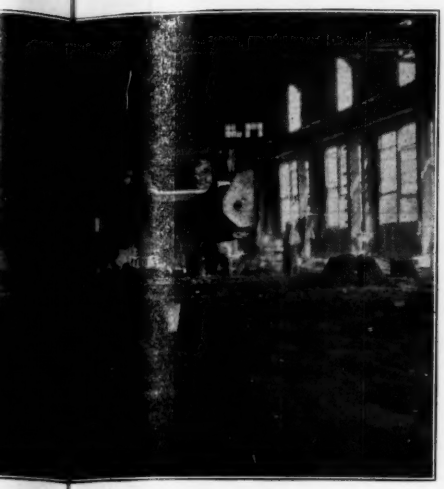
Stone-working shed with crushing plant at far end

Sand molds ready for pouring. Note re

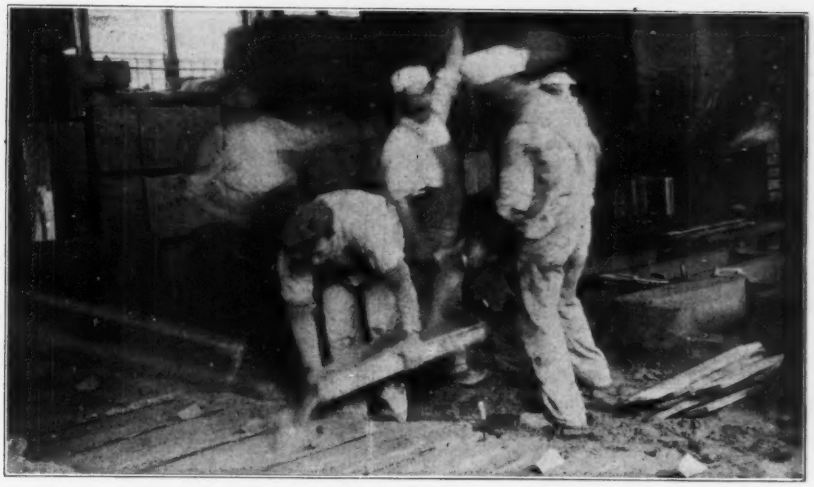
Interior view of shed showing method of casting blocks



A complicated mold showing intricate

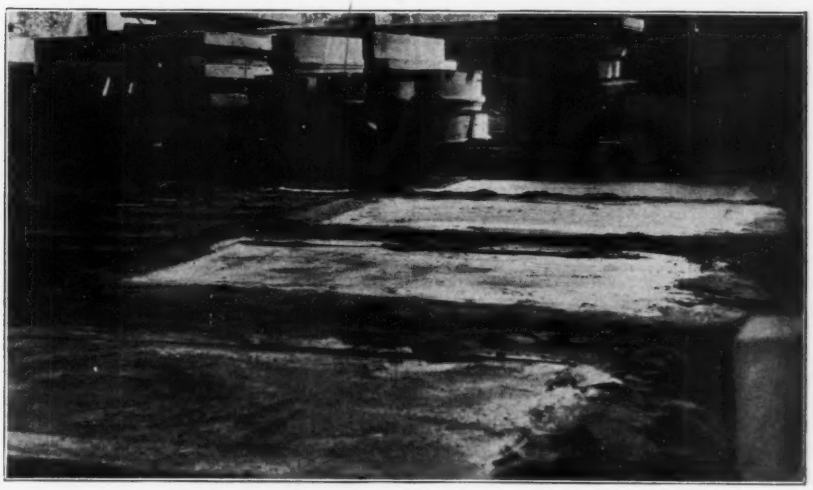


shed showing concrete ladle at right



Pouring molds. Note trough for slowing the velocity

r pouring. Note reinforcement possible



Sand molds recently filled. Note absence of water on surface

showing intricate character of work

Newly-cast blocks waiting for finishing touches at lower end of shed

up) and stored in stacks, with a protective coating of sand adhering to them —as soon as they are sufficiently set to permit safe handling. To prevent their drying out too rapidly an elaborate air-conditioning system is operated from an adjoining part of the plant, so that the interior of the shed is always provided with moist air of a uniform temperature.

At the proper time the concrete blocks or "castings" are cleaned of the sand adhering to them and conveyed to the stone-working part of the plant, at the lower end of the shed. Here every modern stone-working device is provided, including pneumatic chippers, chisels, etc., planers, lathes and polishing machinery.

Like a Stone-Working Plant

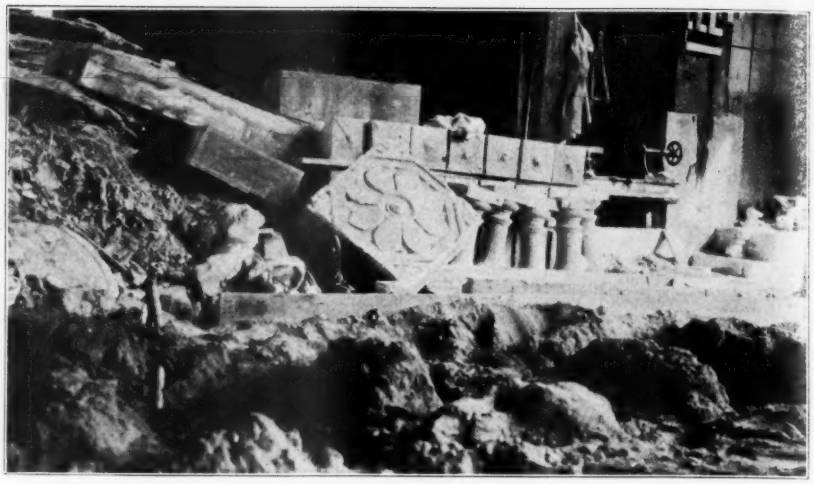
The blocks are given any kind of a facing or finish that limestone or granite will take. If taken at the right stage in the curing process the material can be worked as easily as Bedford limestone, but if allowed to get too hard, of course, the working is more difficult. There being no silica or quartz in the concrete, however, the working process is not so difficult nor as hard on the tools as is the case with ordinary concrete.

When made with white portland cement and finished like cut stone, these concrete blocks cannot be distinguished from the finest white limestone. Tints of ochre or other colors give imitations of all the well-known building stones. Small grains of other ingredients give a wonderfully good imitation of granite.

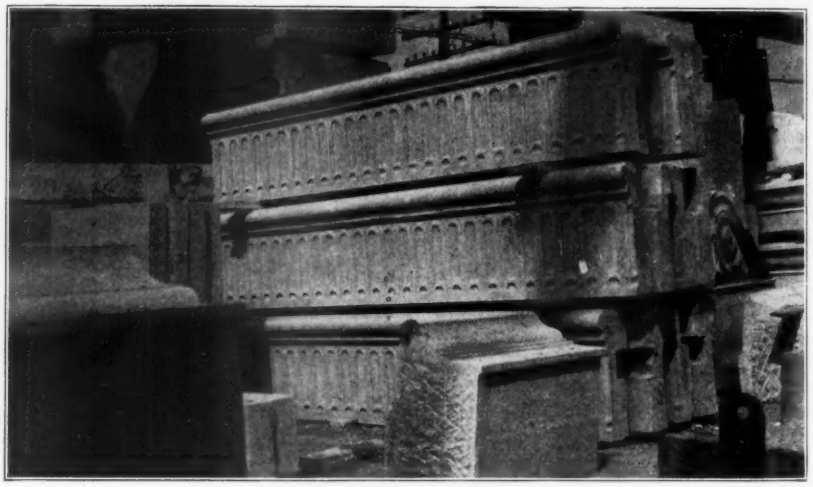
These artificial stone blocks are fast winning recognition by the best architectural firms in New York. They are used for any kind of a building that cut-stone may be used for. The view with this article of the new Church of the Blessed Sacrament, on 71st Street, just east of Broadway, is a good example of how these cast concrete blocks are being used in competition with cut stone.

The plant is but about 17 miles from the borders of New York City and the blocks are loaded on motor trucks and moved to the city and to the job without further handling, thus saving much expense in freight rates, crating, etc.

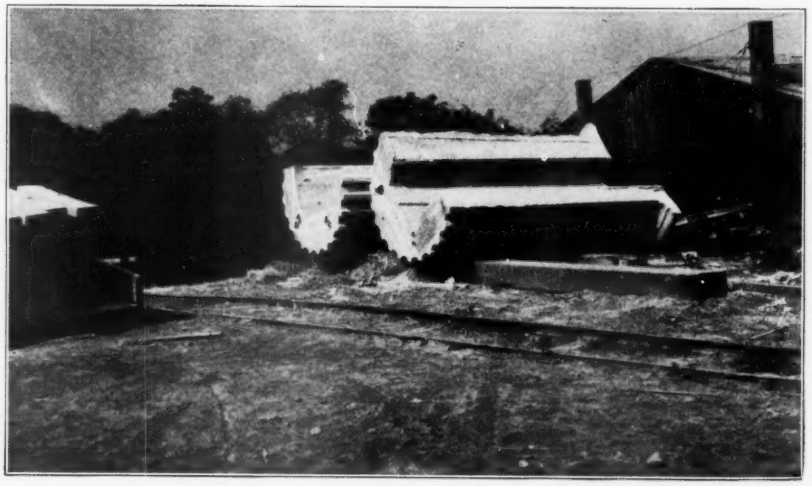
The president and treasurer of the Benedict Stone Corporation is James G. Benedict. The vice-president in charge of operation is F. Mortimer Emerson. The company has an office at 35 West 42nd Street, New York City. This company is the successor of the Emerson-Norris company of New York. Its success is in no small measure due to its long, persistent work in overcoming architects' prejudices to "concrete blocks"—a prejudice apparently based more on sentiment than reason—and the manner in which this was done was by turning out a product of unquestioned quality.



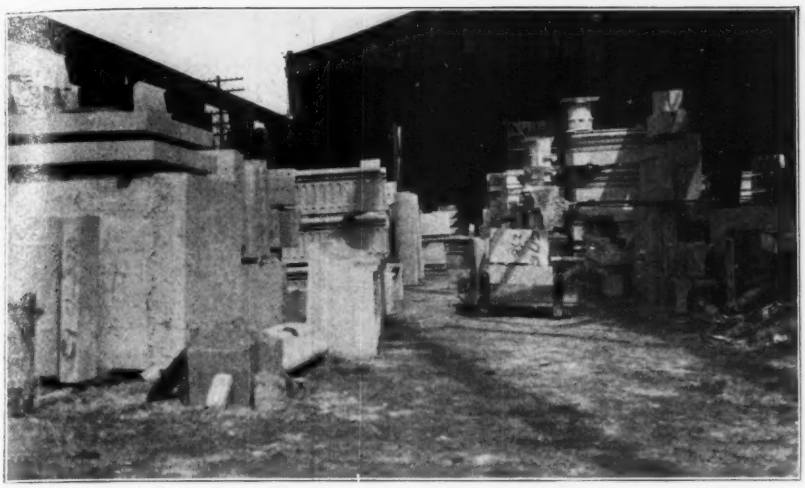
Example of character of work turned out



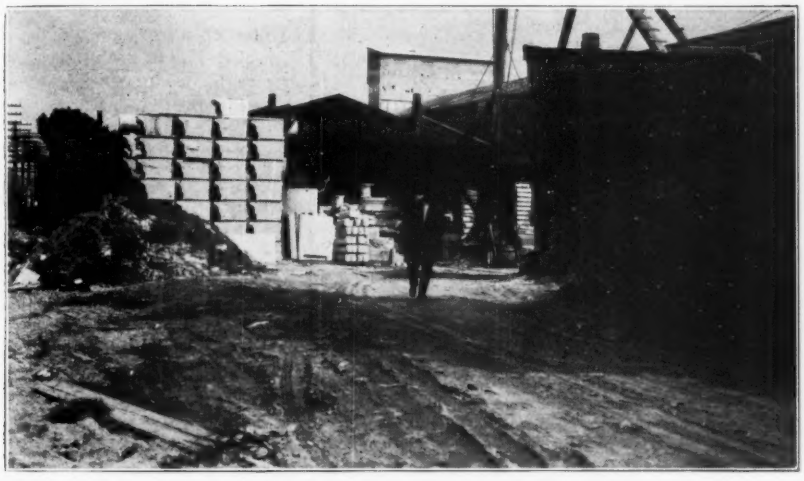
Another example of finished work



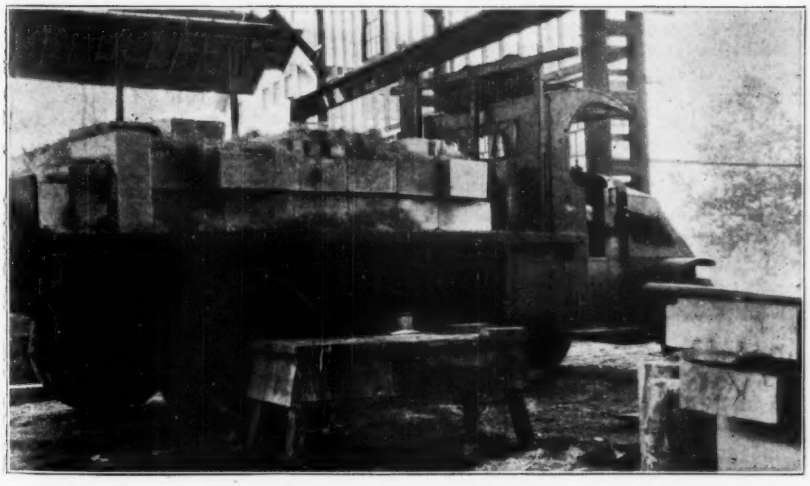
A kind of work that can only be carried out in reinforced concrete—hollow columns



Showing great variety of finished material



Motor truck entrance to plant



Truck being loaded for New York City job

Another Precast Concrete Stone Building

SINCE THE COMPLETION of the Church of the Blessed Sacrament, illustrated in the foregoing article, the School of the Blessed Sacrament has been built adjoining of similar architecture and of the same material.

Besides concrete stone cast in sand molds, as described in the article, there are many other tricks to the trade of making the trim of a building like that shown. Wax, concrete, wood and various other kinds of molds are also employed.

How Various Colors and Textures Are Produced in Cast Concrete

CONCRETE ARCHITECTURAL STONE is available in so wide a variety of textures and colors that these qualities are brought under the complete control of the designer and may be varied as required to match any other wall material. Granite in pink, red, yellow, gray or green; marble in pink, red, yellow, green, black, white and mixed; mica spar in black and transparent colors; sandstone in yellow, buff, red and brown; and sands in a wide variety of shades are the aggregates chiefly credited with making this possible. Then there is the choice between white cement, gray cement and a mixture of the two, and a few reliable mineral pigments which are practically non-fading when used in small quantities.

In the use of mineral aggregates the experienced concrete trimstone manufacturer knows that color and texture are controlled very largely by the grading of the particles. Where there are smooth or delicate surfaces and fine edges, obviously the particles must be limited to small size. Coarser textures are obtained with larger particles and drier consistencies, some textures requiring almost an entire absence of finer material. More pleasing color effects are secured where the fine aggregates are of one color and the coarse particles of another, giving a blended result the shade of which will be influenced by the larger or finer particles in proportion to the relative surface space occupied by each.

Mineral pigments are used sparingly for concrete surfaces exposed to the weather. Half a pound to a pound of red oxide of iron to the sack of cement will produce pink, while greater quantities of the oxide, up to about six pounds, will produce colors varying from terra cotta to red. Gray may be produced with half a pound of carbon black to the sack of cement and added quantities of the black with gray cement will produce slate to black shades. Light buffs and yellows are produced with five to 10 pounds of hydroxide of iron, to which red oxide in small quantities may be added.—A. J. R. Curtis, in "National Builder."

Straight Talk on State Ownership of Cement Plants

H. E. Hilts, Principal Assistant Engineer, Pennsylvania State Highway Department, Former General Manager of the Portland Cement Association, Opens the Eyes of State Highway Officials in Regard to the Portland Cement Industry

IN ANALYZING the question whether the State should own and operate its own cement plant the hypothesis should be developed upon the basis of business economics; it is unsound to attempt to analyze it from the viewpoint of political expediency.

There are two principal reasons for the consideration which is being given today to the matter of State operation of portland cement plants. The first of these is the difficulty which, especially during the past season, has been experienced in securing cement in sufficient amounts and with sufficient regularity for economical use by the consumer. The second is the increase in the cost to the consumer which has occurred during the past few years.

The actual production of portland cement by existing mills has never reached more than 80 per cent of the 125,000,000 bbls. which is their estimated annual capacity. In 1920 the production was the largest in history—100,000,000 bbls.

What are the reasons for this failure to develop the full capacity of the plants? Prior to the war the reason was lack of demand; during the war it was governmental restriction; and in the last year or two it has been demoralized transportation facilities and the inability of the plants to obtain fuel, supplies, containers, etc., regularly and in sufficient quantity to permit economical operation. These are conditions over which private cement plants have no control. They affected all business in much the same manner. Every State highway department, for example, has felt the lack of transportation facilities, and knows that it was due, largely, to embargoes and special service orders, strikes, and the general post-war era of extravagant inefficiency of labor. A State-owned plant would probably have faired no better during these strenuous times, and, very likely, would have suffered in the same ratio as private industry.

It now seems that our economic processes are in course of orderly adjustment, and that the conditions which have hampered us in the past are slowly but surely being righted. It is fair to assume, therefore, that as conditions improve, the production of cement will more nearly approach the potential producing capacity of the existing plants; and certainly there is little to be gained by building new plants, whether privately owned or State owned, until the conditions permit full operation of existing plants.

H. E. Hilts

Editor's Note

THIS IS A BRIEF and rather inadequate abstract of a 14-page article on "Shall the State Own and Operate Its Own Portland Cement Plant?" in the January issue of "Public Roads", the official publication of the United States Bureau of Public Roads.

In preparing and giving to this government publication a comprehensive statement of the cement industry Mr. Hilts has in all probability had the generous assistance of his cement manufacturer friends. The cost tables he has presented show that he must have had their active co-operation.

Mr. Hilts has done the cement industry an invaluable service in presenting to the entire highway-building fraternity a comprehensive study of the cost of manufacturing portland cement. Likewise, he has done the public an inestimable service by thus educating their highway officers.

Much that Mr. Hilts says can be applied with equal force to state or county-owned crushed-stone, sand and gravel and agricultural lime plants.—The Editor.

Having in mind the pronounced activity of the manufacturers in their efforts to augment production and distribution on economical lines, and considering, also, that our transportation facilities will gradually right themselves under private operation, it is likely that more desirable conditions will soon materialize. At any rate it is improbable that the States will again experience the abnormal conditions which held during the Summer of 1920, provided the state officials will acquaint the cement producers with their estimated requirements.

Taking these features into consideration, it would seem that the necessity for a state-owned plant, as far as demand is concerned, might be analyzed on the basis:

1. That the construction of a new state plant is not justified in a state where the rated production capacity of existing mills was greater than the demand in 1920.
2. Where the total demand in the state was less than, say, 400,000 bbls. in 1920.
3. Where it cannot be conservatively estimated that the demand for state business, year in and year out, will be practically steady.

Co-operation between state officials and cement producers is necessary to obtain better service, so that the cement plant operator may have a reasonably clear idea of his obligations. If a cement manufacturer should give an option on 100,000 bbls. of cement to 100 customers he would be obliged to supply 10,000,000 bbls. if every customer should enforce his option. The manufacturer, therefore, must keep himself in a position to supply that quantity of cement at the contract unit price. Conversely, if some or all of the holders of options should take less than the full quantity covered by their options, the manufacturer would have on hand a quantity of unsold cement which he, perhaps, could have disposed of elsewhere to advantage, if he had known his outstanding options would not be enforced. This point is a most important one, involving as it does, the manufacturer's relations with a large consumer such as a state highway department.

In many states the present yearly cement requirements for state highway work are from 15 to 20 per cent of the total available production, and this percentage is required during the six months of heaviest demand. It is essential, therefore, that the manufacturer schedule his output so that the other customers shall receive as large a proportion of their requirements as possible during the months of minimum demand. Both the consumer and the producer must make increasing endeavors to stock and store materials, so that not only manufacturing plants but the transportation agencies as well can operate under normal working conditions.

Availability of Raw Materials

In many states all available materials are now either owned or under option, and there are several states in which there have been found no satisfactory materials in sufficient quantity to justify the construction of a cement plant. This is notably the case in the New England States, in Wisconsin, and in some of the southern states. It is essential, therefore, before taking steps looking toward the construc- of a new cement plant, to determine that there is satisfactory raw material available at strategic locations and in sufficient quantity to enable the plant to operate continuously for a long term of years.

The experts in the cement field closely follow the development of prospective sales fields, and every large cement manufacturing corporation employs men who are constantly exploring new territory, both with regard to the establishment of new plants and to increasing the radius of their sales fields. It is essential that every company keep its transportation rate contour investigations up-to-date inasmuch as this feature enters to a very large degree into the final unit costs and profits. The restriction of sales territory is common in every basic industry which has been susceptible of broad expansion inasmuch as new plants are being constantly established. The cement industry is perhaps the most striking example of this principle, due largely to widespread available raw materials.

The history of the cement industry is replete with glaring examples of financial failures, and a great many of the companies now in existence have passed through bankruptcy. There have been many cases where promotional schemes have been fostered, plants built, only to pass completely to the junk pile or to become eyesores to those who invested their savings in them. The poorest cooperation a manufacturer of any commodity can give the purchasing public is that of selling his product at a price below the cost of production or of so running his business as to grant undue extension of credits.

Selling any product at a price that will net an exorbitant profit is economically unsound and will ultimately limit the use of that product.

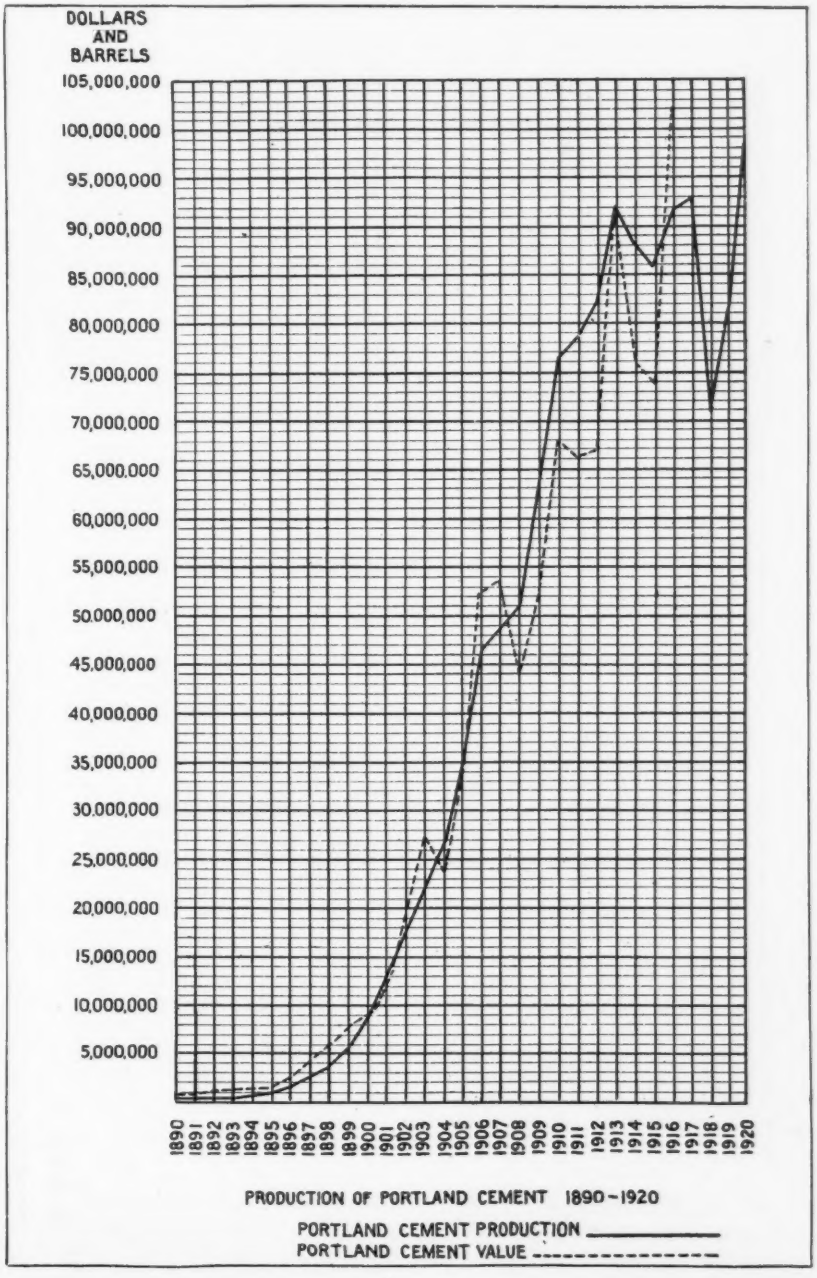
Cost of a Cement Plant Today

The first cost of a first-class portland cement plant of 600,000 bbls. capacity per year, assuming an operating period of 350 days per year, is $2,920,000. Such a plant would be so designed that there is minimum maintenance requirements, equipped with raw material storage bins, up-to-date dust-collecting systems, waste-heat boilers, a central generating plant with all machinery supplied with unit electric motors. It is further assumed that a sanitary system, a pumping station and a cement stockhouse of 150,000 bbls. capacity, a main office building, dispensary, and sufficient trackage to facilitate train movements, both from and to the mill, will be required.

For a second-class plant of the same capacity, built with a view to detailed structural maintenance from time to time, and with dust-collecting systems, sanitary system, dispensary, etc., eliminated, the estimated cost is $2,090,000.

Following are some of the items entering this estimate:

	1st-Class Plant	2nd-Class Plant
Raw material mill, bins and accessories	$ 511,000	$ 319,000
Coal mill and accessories	95,000	69,000
Kilns (2—150-ft.) and accessories	290,000	138,000



Waste-heat boiler installation	200,000	175,000
Finishing mill and accessories	260,000	224,000
Clinker storage (crane)	75,000	62,000
Cement stock house (150,000 bbl.), sack storage, storeroom, machine and blacksmith shop and accessories	450,000	290,000
Sanitary installations, pumping plant, main office, clock houses, temporary buildings, sewer system, compressed air system, etc.	249,000	108,000
Electric generating station and accessories	245,000	205,000
Trackage	120,000	100,000
Quarry and crushing plant and equipment	175,000	150,000
Real estate (250 acres)	125,000	125,000
General overhead expense	125,000	125,000
Totals	$2,920,000	$2,090,000

Reduced to unit costs this is $4.865 per bbl. for a first-class 600,000-bbl. plant and $3.483 for a second-class 600,000-bbl. plant.

The cost of operation of a 2,000-bbl. per day plant, in the particular section of the country under discussion, has increased 61.4 cents per bbl. in 1915 to $1.76 per bbl. in 1920 (total mill cost). For a 3,900-bbl. per day plant, the cost of operation increased from 57 cents per bbl. in 1915 to $1.315 in 1920. The administration, overhead and selling expenses in 1915 were about 17.5 cents per bbl. and in 1920 were 21 cents per bbl.

The German Cement Industry

(Howard W. Adams, representative of the Department of Commerce, Berlin)

GOVERNMENT OPERATION of the German cement industry, put into effect on January 1, 1917, was provisionally dispensed with on July 27, 1920, by an order issued by the Federal Ministry of Labor. This action was taken because the pressing demand for cement appeared to be satisfied, with a resultant diminution in sales. Bavaria, however, was excepted from the operation of this order. The Government, through the Federal Commissioner for Cement, still retains jurisdiction over the fixing of prices for the domestic market.

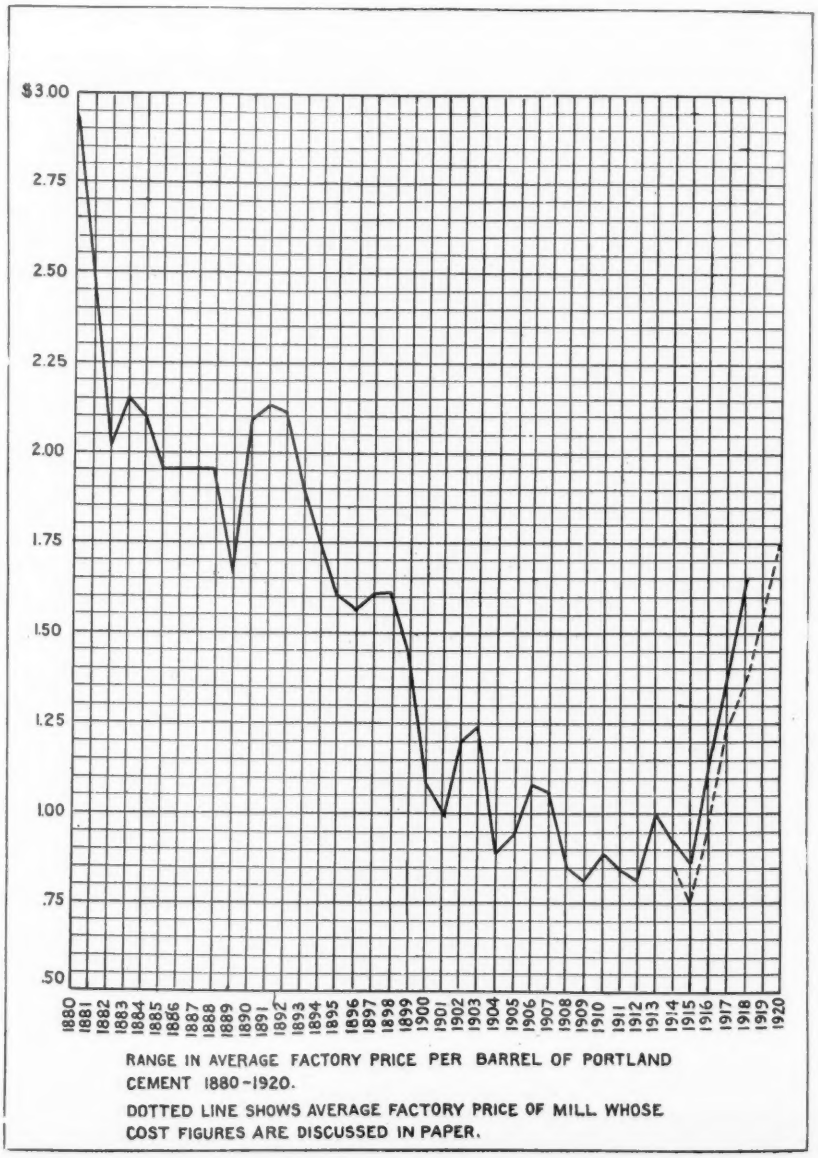
The price of cement in Germany at the outbreak of the war was 350 marks per 10,000 kilos (kilo=2.2 pounds) for both Government and private contracts. Following the establishment of Government operation of the cement industry and the accompanying official regulation of prices there was a rapid rise in the cost of this commodity. The following prices per 10,000 kilos (f. o. b. mill and exclusive of packing) show the course of these prices since 1914:

Periods	On Government Contracts Marks	On Private Contracts Marks
Aug. 1, 1914	350	350
Jan. 1, 1917	430	430
Oct. 1, 1918	735	760
Apr. 1, 1919	885	910
Apr. 1, 1920	3,991	4,061
Aug. 1, 1920	3,330	3,400

During the middle of last summer the production of cement was somewhat increased, due in part to the resumption of operations by the Offenbacher Portland-Zementfabrik (Gruppe der Portland-Zementwerke Heidelberg - Mannheim-Stuttgart) after lying idle for a period of more than five years. The cement industry in Germany has not felt the effect of the coal shortage as much as other lines of manufacture for the reason that the mills were, to a considerable extent, able to use low-grade coal. Germany has resumed the shipment of cement to foreign markets.

Recent Prices for Cement

An idea of the recent domestic prices of German cement may be gained from the order issued December 8, 1920, by the Federal Commissioner for cement, with retroactive effect from November 1, 1920, and extending to and including January 31, 1921. According to this order the following prices are fixed for this period: For the district of the North German Cement Manufacturers' Association, 3,200 marks per 10,000 kilos (f. o. b. mill and exclusive of packing); the Rhine Westphalian Cement Manufacturers' Association, 3,100 marks; and for that of the South German Cement Manufacturers' Association, 3,300 marks. Proportionally lower prices are fixed for contracts for cement to be furnished the State governments for use in public buildings. The three sets of prices indicated above represent a considerable reduction over the prices fixed for the three months preceding November 1, such reduction being to the extent of 200 marks, 300 marks, and 100 marks, respectively. In this order of the Government protection was provided the manufacturers against increases in the cost of coal during the November 1-January 31 period by allowing for an increase of 55 per cent.



RANGE IN AVERAGE FACTORY PRICE PER BARREL OF PORTLAND CEMENT 1880-1920.

DOTTED LINE SHOWS AVERAGE FACTORY PRICE OF MILL WHOSE COST FIGURES ARE DISCUSSED IN PAPER.

Texas Cold on State Cement Plant

State Highway Engineer Says Idea Is Impractical

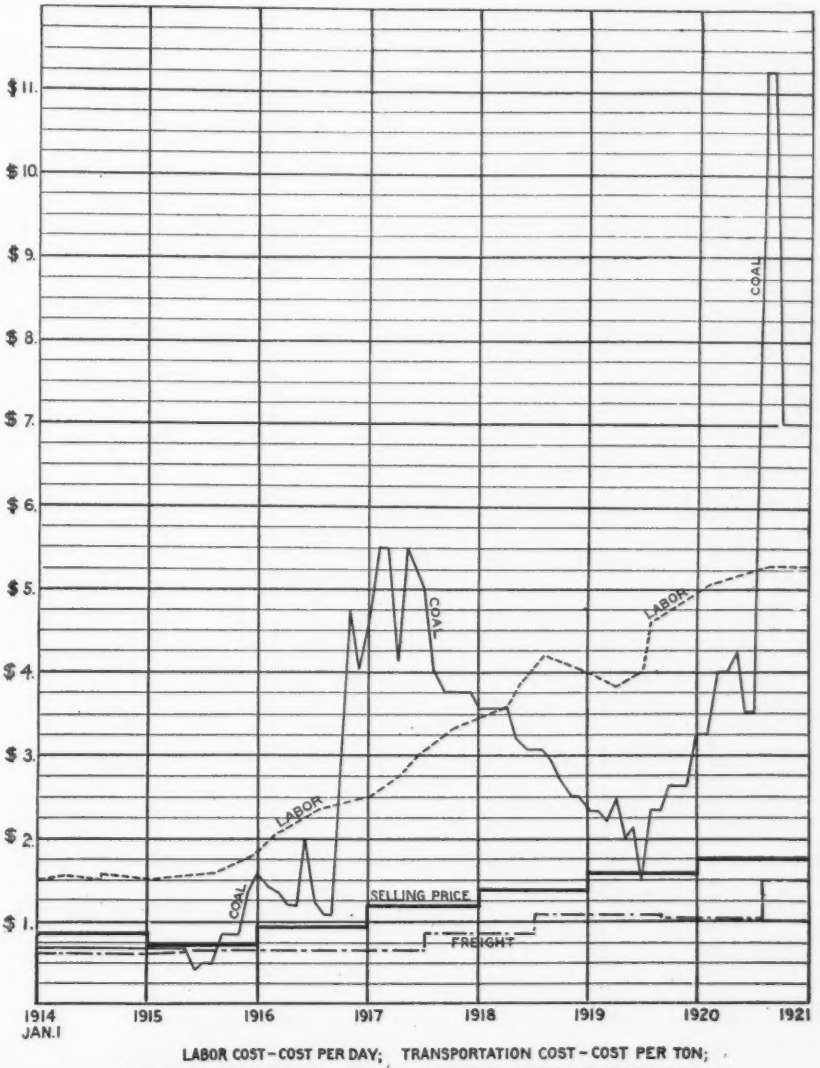
THERE WERE TWO FUNDAMENTAL PRINCIPLES that we had in mind at the outset of our investigation of the practicability of a state-owned cement plant. The first was that the cement industry which we were considering entering is only incidental to the main business in which we are engaged. Our main business is the construction of highways and in that work we need some cement, a large amount or small amount as it may be. Keeping in mind, therefore, that the production of cement is essentially a sideline, we have asked ourselves two questions—first, is our demand for cement large and constant enough to enable us to make a profit on this sideline, as you might call it; second, is the present source of supply not reliable enough to enable us to proceed with our main business in an efficient way? The other main consideration that we had in mind was the fact, that we consider has been well established, that a Government-owned plant of any kind can not be operated as efficiently as a privately-owned plant.

With these considerations in mind, we went to the cement companies and gave them the opportunity of presenting the facts from their standpoint. They threw open their plants and their records to us, and as a result, we have been able to get a little light on the subject. But the further we have gone into the investigation the more nearly have we come to the conclusion that it is a proposition we do not care to recommend to the State. Certainly, if we can depend upon the cement companies enlarging their plants sufficiently to take care of our future needs, we do not care to enter into the cement business. One of the principal deterring reasons is that we do not know whether a single state-plant would improve matters. Our territory is so large that there is no doubt that we could use the entire output of a plant with a daily capacity of 2,000 barrels, but, of course, that plant would have to be located at one point. We could not compete with the five privately-owned plants that are scattered throughout Texas, due to the freight rate and transportation problem. Therefore, the territory in which we could economically use cement from our state-owned plant would be restricted, and we would either have to take care of only part of our demand from the state-owned plant or would have to establish several plants in order to meet the competition. Therefore, instead of the investment being two or two and one-half million dollars, it would be several times that. We would be entering into a very large industry and we do not believe it advisable to develop a sideline to that extent.—January "Public Roads," published by the U. S. Bureau of Public Roads.

Nevada Commission Against State Making Cement

AFTER AN EXHAUSTIVE STUDY a commission authorized by the 1919 legislature of the state of Nevada has reported to the governor of that state the inadvisability of the state erecting and operating a cement manufacturing plant. The commission found that a liberal estimate of the yearly consumption of cement within the portions of the state that would be available as markets would be in the neighborhood of 60,000 bbl. The basis upon which the report was made was the construction and operation of a plant of 500 bbl. per day, though unit costs were estimated on the basis of 200 and 250 working days per year. Exclusive of the money involved in acquiring a site the commission estimated the first cost in the neighborhood of $400,000 and the sum of fixed charges, operating costs and maintenance an additional $300,000. It advised the governor of the state that using as a basis 100,000 barrels per year produced in 200 days, the unit cost would be $2.565 per barrel. Based upon 125,000 barrels or an operation of 250 days the cost would be reduced to $2.406. The commission gave the opinion that a more logical per barrel cost would be in the neighborhood of $3.25 a barrel.

The members of the commission were H. P. Boardman, chairman, college of engineering, University of Nevada; and J. C. Jones and F. M. Cottrell.



LABOR COST – COST PER DAY; TRANSPORTATION COST – COST PER TON; COAL COST – COST PER TON; SELLING PRICE PER BARREL OF CEMENT OF MILL QUOTED IN FIGURES NOS. 18 AND 19.

Practical Chemistry for Lime and Cement Manufacturers

Sulphur and the Sulphur Family of Elements

By Richard K. Meade, M. S.
Consulting Chemical and Industrial Engineer, 11-13 Fayette Street, Baltimore, Md.

THE SULPHUR GROUP comprises besides sulphur, oxygen and two rare elements, selenium and tellurium. Tellurium and selenium are comparatively rare elements, although the first is frequently found as a waste product in the electrolytic refining of copper. Both are gray powders and are quite similar to sulphur in chemical properties.

Sulphur was one of the earliest known elements because it exists free in nature. It is found free in Sicily and in Louisiana in large quantities. It also occurs in combination with many other elements to form various minerals, among the most important and also the most common of which are *pyrite*, iron sulphide, FeS_2, and *gypsum*, calcium sulphate, $CaSO_4+2H_2O$.

Solid sulphur has a bright yellow color. It is insoluble in water but soluble in carbon bisulphide. It melts at about 230° F. yielding a yellow liquid which becomes darker as heated to a higher temperature until it reaches 833° F. when it begins to boil.

Sulphur is ordinarily seen in the form of a powder known as "flowers of sulphur" and in stick or lump form. Both latter forms are simply sulphur which has been melted and in the former case poured into a moid and in the latter case allowed to cool and broken up. Sulphur is mined in Louisiana by forcing superheated steam into the sulphur bearing strata. This melts the sulphur and it is brought to the surface with the condensed water and collected.

Sulphur burns in air with a pale bluish flame giving sulphur dioxide, $S+O_2=SO_2$. Sulphur also combines with most of the metallic and non-metallic elements. With hydrogen it forms a gas, hydrogen sulphide, H_2S, and with chlorine and carbon liquids, carbon tetrachloride, CCl_4, and carbon bisulphide, CS_2, respectively.

Sulphur is used principally for the manufacture of sulphuric acid, sulphur dioxide and compounds of sulphur. It is employed also in the manufacture of (black) gunpowder, in vulcanizing rubber, for bleaching, in the manufacture of wood paper pulp, for tree and plant sprays, and in medicine.

Sulphur Dioxide

When sulphur burns in either oxygen or air, a gas sulphur dioxide, SO_2, results. This gas is colorless and has a disagreeable penetrating odor—the smell of burning sulphur. The gas may be readily liquefied by cooling it with ice and salt and subjecting it to a pressure of about three atmospheres (about 45 lbs.). It is so liquefied and shipped in steel drums and used for bleaching, in ice machines and in the manufacture of certain chemicals.

Sulphur dioxide is quite soluble in water and the solution has acid properties. This solution is generally considered to contain sulphurous acid and on neutralizing with bases, sulphites or salts of sulphurous acid are obtained. A solution of sulphur dioxide gradually oxidizes in air forming sulphuric acid thus—

$$So_2+H_2O+O=H_2SO_4$$

Sulphuric dioxide is the first step in the manufacture of sulphuric acid.

The most important compound of sulphur is sulphuric acid. This acid is the basis of the chemical industry and there are few chemicals in whose manufacture it does not play some part. Large quantities of this acid are consumed in the manufacture of fertilizers, explosives, dyes, other acids and chemicals, in oil refining, etc.

Sulphuric Acid

Sulphuric acid is a heavy colorless oily looking liquid. When of full strength it has a specific gravity of 1.84. By specific gravity is meant the comparison of the weight of a unit volume of a substance with the weight of the same volume of water. When we say that the specific gravity of strong sulphuric acid is 1.84 we mean that a cubic foot (or any given volume) of sulphuric acid is 1.84 times as heavy as a cubic foot (or any given volume) of pure water, etc.

When strong sulphuric acid is mixed with water much heat is evolved. It absorbs water readily from other substances and will thus char organic matter.

Sulphuric acid is a very strong acid which readily displaces other acids from their various salts. Thus, if a chloride is heated with sulphuric acid, hydrochloric acid is liberated; if a nitrate, nitric acid, etc.

$$2NaCl+H_2SO_4=Na_2SO_4+2HCl$$
$$2NaNO_3+H_2SO_4=Na_2SO_4+2HNO_3$$

The manufacture of sulphuric acid is a rather complicated process but proceeds along the following general lines. Either sulphur or iron pyrite is burned in suitable furnaces to form sulphur dioxide, the pyrite burning almost as readily as the sulphur the reaction being

$$2FeS_2+11O=Fe_2O_3+4SO_2$$

To the burner gas, which consists of sulphur dioxide, nitrogen and the excess air, are added steam and nitric fumes made by acting on sodium nitrate with sulphuric acid as indicated above) and the mixture is then passed into lead chambers or rooms when the sulphur dioxide is converted to sulphuric acid according to the general reaction.

$$SO_2+2NO+O+H_2O=H_2SO_4+NO$$

The sulphuric acid collects in the bottom of the chamber and the waste gases, air and nitrogen pass out through towers.

It will be seen that the nitrous oxide does not enter the product and much of this is recovered by washing the exit gases in towers filled with coke over which dilute sulphuric acid trickles.

The sulphuric acid so collected is not full strength but is mixed with water from the steam. It can for some purposes be used as collected here, but for others it must be concentrated by evaporation.

Sulphur in Coal

Coal contains some sulphur, the amount usually varying from 1 per cent in good coal to 3 or 4 per cent in poorer quality fuel. When this coal burns its hydrogen is converted of course into steam (water) and some steam also results from the moisture in the coal. The sulphur forms sulphur dioxide and hence we have all the necessary elements to form sulphuric acid. Now sulphuric acid will attack metal, particularly wrought iron and steel most readily and gradually corrode and eat this away when exposed to it. This explains why the gas resulting from the burning of coal is so destructive to the iron work on top of lime kilns and on other metal work such as boiler tubes, subjected to the action of gases from coal fires. Cast iron is less effected by sulphuric acid than is steel or wrought iron.

Sulphur forms with hydrogen a gas called "hydrogen sulphide" (or sulphuretted hydrogen), H_2S. This gas is a very interesting chemical substance but is not of much practical use in the arts. It has the odor of rotten eggs and occurs in certain mineral waters ("sulphur springs").

Prospects of a Car Supply for Sand and Gravel*

Reason to Believe Conditions Will Not Be Far Different from Last Season

By E. Guy Sutton
Executive Secretary, National Association of Sand and Gravel Producers, Washington, D. C.

THE CONTROLLING FACTORS—labor conditions and fuel demand—are in themselves so uncertain that no trustworthy prediction can be offered as to what the open-top car situation will be for this year.

It is estimated that there are 350,000 open-top cars lying idle at the present time. An unusually large percentage of these cars are on their home lines which is a most favorable aspect of the situation, since the necessity for relocation of cars last year was responsible for a large part of the transportation difficulties.

The new cars purchased in the last four years will probably not equal the number that have been retired from service. There has been no material improvement in the trackage or terminal facilities. There has been, however, a relative increase in car service through the intensive use of existing equipment, which will prove advantageous to all shippers.

At the present time the output of coal is 40 per cent below the maximum weekly production of 12,000,000 tons. Coal accumulated last fall at high prices is being consumed, so it is likely that by May 1 there will be no reserve stocks on hand. If, therefore, there should be a normal revival of business in the late spring there will again be a heavy demand for the movement of coal during the height of the building season.

Coal is already moving to the lake ports and is being loaded, ready to go to the Northwest as soon as lake transportation is resumed. It is reported, however, that there will be a vast amount of coal left over from last season's shipments in that section of the country, and this fact will not stimulate early purchases, especially if it remains possible for an emergency to be declared later to take care of improvident buyers.

In testifying before the Senate Committee on Manufactures on Jan. 18, Chairman Clark, of the Interstate Commerce Commission, made the following statement: "The acute car shortage of last year may again be experienced unless a means is devised to bring about the transportation of coal in advance of seasonable requirements."

Whaley-Eaton Service, in their news letter of Feb. 26, make the following comment: "It is admitted the cost of railroad operation must be brought down, but opinions are conflicting as to how much trouble will result in the process. We hear that the labor elements will in no case rely on a general strike, but any tie-up attempted by 'legal' or 'illegal' walkouts of particular classes will follow the tactics employed last spring. We hear prophesies that this situation will begin to be acute about April 1."

It is said in some quarters that the bituminous coal operators consider it necessary to reduce wages. If such a course is decided upon, no doubt a miners' strike will follow.

Optimism should prevail for the effect it may have in encouraging construction work, but is only good business to keep in mind when making your contracts this season that interruptions to your operations may be expected so long as the Interstate Commerce Commission retains its power to grant preferential car supply.

Federal Legislation

The Calder bill, proposing to regulate the coal industry, was reported out of the Senate Committee on Manufactures in a greatly modified form. The bill, as it stood at the close of the 66th Congress, declares coal to be charged with public interest and use and contemplates the collection and compilation, through governmental agencies already established, of accurate data with respect to the production, distribution and cost of coal. An effort will be made to put the measure through at the extra session of Congress.

The final report of the Committee on Reconstruction and Production was submitted to the Senate on March 2. The report contains many facts and conclusions that will be of absorbing interest to the producers and users of building materials. Some of the recommendations of the committee are expected to form a basis for remedial legislation intended to improve the transportation situation. A copy of the report will be mailed to you when available for distribution.

The Sells bill, carrying an appropriation of $100,000,000 for Federal Aid Highway work, to be available in 1922, passed the House but was killed in the Senate Committee on Post Offices and Post Roads.

Proponents of the Townsend bill, designed to create a Federal highway commission and establish a national highway system, were apparently responsible for the failure of the Sells bill to be reported out of the Senate committee.

Unless the Sells bill or a similar measure is passed at the extra session, all but eight states will be without Federal aid money by the end of this year, while many states have already exhausted their previous allotments. We will have more to say later about this important matter.

Extension Campaign

It is generally expected that Congress will be convened in extra session soon after April 1. In the time intervening President Johnson of the association and the writer will hold a series of meetings in some of the Western and Northwestern states, including Texas, California, Washington, Oregon, Utah, Colorado, Minnesota and Wisconsin. A full account of these meetings will be published in a subsequent number of the Bulletin. While this campaign is in progress V. P. Ahearn, who has been secured as office assistant, will look after affairs at the Washington headquarters.

*Circular No. 1—1921, National Association of Sand and Gravel Producers.

Freight Rates in Louisiana Will Not Change

THE TWENTY-TWO railroads entering Louisiana have agreed to cease their demands for rate increases on road materials (sand, gravel and crushed stone) which the Interstate Commerce Commission was to take up soon.

By the railroads' action many thousands of dollars will be saved the people on roadwork, according to Wylie M. Barrow, assistant attorney-general, representing the state railroad commission.

The railroads have shown that they appreciate the Louisiana producers' situation and will continue to haul the materials at the rates in effect prior to Aug 26, 1920.

Indiana Law Will Help Material Men Collect Debts

Contractor's Failure to Pay for Sand and Gravel May Send Him to Jail

ONE OF THE BEST PIECES OF LEGISLATION for the sand and gravel producer that was ever put on the statute books of Indiana is that which has been passed by the last Legislature and which has just been signed by the governor, and which makes failure of contractors to pay material bills a misdemeanor. The bill applies to contractors of all kinds, including road construction contractors and those in building construction. It is expected to reduce to a minimum the legal entanglements that have surrounded the industry when a dishonest contractor failed to pay the material bills, thus involving liens, etc. This was especially true in the building end of the business.

Under the former Indiana laws in case the contractor did not pay his bills the only recourse was to file a lien against the property. This at once involved the sand and gravel producer in litigation, necessitating expense and time. While the new law does not take away this protection to the sand and gravel men and other material men, its provisions make dishonesty on the part of a contractor a highly precarious chance. If the contractor does not pay, the sand and gravel producer still has recourse to the lien law, while the contractor pays a fine or goes to jail.

The bill provides "that any person, firm or corporation, who, as contractor or sub-contractor, or otherwise shall have performed labor, supplied services or furnished material or machinery in the construction, reconstruction, erection, repair or remodeling of any building, structure or any other work of any description whatsoever, and who shall accept payment in full for the labor, services, material or machinery so furnished and supplied, and who at the time of receiving such payment is indebted to another or others for labor, services, material or machinery used or employed in the construction, reconstruction, erection, repair or remodeling of such building or structure, and who at the time of receiving such payment shall fail or refuse to notify in writing the person, firm or corporation from whom such payment was received, of the existence of such outstanding indebtedness, and if the person, firm or corporation from whom such payment was received shall suffer loss thereby, such person, firm or corporation or the responsible officer thereof so accepting such payment shall be guilty of a misdemeanor and upon conviction thereof shall be fined in any sum not exceeding $1,000 or imprisoned in the Indiana State Farm for not more than one year, or both such fine and imprisonment in the discretion of the court."

This bill should enable the material men to collect their money in a more satisfactory manner than heretofore.

Kansas Stone Industry Reviving

THE STONE INDUSTRY in Kansas is coming back to its former status. Twenty or thirty years ago the quarrying of limestone was one of the big industries in Chase County. Later, this stone as a building material, was replaced to a large extent by concrete. Now, according to some of the larger construction companies and builders, good building stone is likely to come back under present conditions in the cement market.

The fine limestone of this county is lying in almost unlimited quantities near the surface of the ground and all that needs to be done is to reopen the deserted quarries.

Texas Sand, Gravel and Crushed Stone Association Meets

Freight Rates the Big Issue Discussed at San Antonio, March 10

SOME MEMBERS of the Texas Sand, Gravel and Crushed Stone Association have to travel as far to their association's meetings as Eastern producers travel to National Association meetings. Texas is a big state and it has a live group of producers.

At the first annual meeting of the association held at Menger Hotel, San Antonio, March 10, the most important subject discussed was the problem of freight rates. In Texas, as in many other states, the freight rates applied on sand, gravel and crushed stone are not in proportion with the value of the commodity and therefore are very unjust from the point of view of the producer.

E. E. Eikel, of the Dittlinger Lime Co., New Braunfels, chairman of the transportation committee called attention to the fact that his committee would help individual members in matters pertaining to freight rates, car supply, demurrage, overcharges and switching.

E. Guy Sutton, secretary of the National Association of Sand and Gravel Producers presented a most interesting address to the association, in which he outlined the work of the national body and its plans for the future, especially as concerned the executive offices at Washington, D. C.

R. J. Potts, of the Potts-Moore Gravel Co., Waco, chairman, of the specifications committee, requested that all individual members bring their particular problems to the association where it could possibly be solved for them.

T. H. Webb, of the Texas State Highway Department, Austin, presented to the association an outline of the work done by the State Highway Department. He also spoke on specifications and tests of materials. A general discussion was then had on this subject, with Mr. Webb answering any questions put to him by the members. A discussion also took place on the relative merits of sales by the ton and sales by the cubic yard, without any formal action being taken by the association.

Mr. Eikel presented a very complete discussion of the irregularities existing in the present freight-rate schedules and also presented suggestions for a uniform schedule. He suggested that the association employ an experienced rate expert to prepare data relative to ironing out the present existing irregularities. The association took no formal steps regarding Mr. Eikel's suggestions, except to appoint committees to look into the matter and to report to the executive committee at a later time.

All of the officers elected at the meeting last year were re-elected. The officers are:

President, J. G. Strawn, Clem Gravel Co., Dallas; vice-president, Geo. P. Maury, Mineral Wells Crushed Stone Co., Mineral Wells; secretary-treasurer, Rhea Miller, J. Fred Smith Gravel Co., Dallas.

The executive committee consists of J. G. Strawn, Robert J. Potts, Miss Hazel J. Cummings, E. E. Eikel, E. L. Dennis and Rhea Miller.

The annual dues to the association were fixed at three mills per ton based on the number of tons produced in the State of Texas for the preceding calendar year. The dues are to be paid quarterly in advance, the maximum dues for the year being $1200 and the minimum $25.00.

The city of Houston was selected for the next meeting, although no definite date was decided upon.

Editorial Comment

Storing Coal

Last year's experience showed lime and cement manufacturers that it pays to be forehanded in the matter of coal supply. Right now, it is believed by many operators, coal is nearly at rock bottom prices. There is very little movement and the general slackness in industry and the unusually mild Winter has left considerable stocks on hand in all the big cities.

It is hardly likely that the coal operators will attempt the same game they did last year, but nevertheless there is every indication of another shortage in open-top car equipment as soon as some of the big road-building projects open up. Material men who are urging upon highway officials that now is the time to move construction materials should not forget if their arguments hold, that it is an equally good time to move coal for their own use.

It takes nerve to stock up with anything in these days, but at the same time foresight is better than hindsight. Also, material manufacturers will be doing their bit to avoid congestion of traffic later on, and all the attendant ills.

Concrete Products

Producers of sand, gravel, crushed stone and slag are showing much interest in the development of concrete products. Every producer of raw materials knows that the farther a manufacturing process is carried the more the profit in the operation, all things considered, provided he is equipped to sell a manufactured product. Some producers of mineral aggregate are beginning to realize that they can cash in on their intimate relations with the construction industry a lot more easily than a total newcomer, or a total stranger to the building industry.

The concrete block and concrete product business was for so long a time a picayune affair, conducted in city backyards by one or two workmen, that many do not yet realize the tremendous progress made within the last few years. Now it has become a real business, worthy of the notice of real business men.

There is no group of business men better qualified or more advantageously situated to take advantage of the present demand for concrete building products than the average producer of sand, gravel, crushed stone, or crushed slag. On the average it probably costs very little more to distribute the finished products than it does the raw materials, and the man with the raw materials cheap and handy is the logical man to realize all the profit that can be made from them.

Paint Extenders

F. P. Ingalls, in his series of articles now running in Rock Products, is clearing up many of the mysteries in regard to the use of silica, pulverized limestone and other products of the quarry. Hitherto, many quarry operators had an idea that these materials were solely adulterants and the less said about this part of their business the better for all concerned.

Mr. Ingalls' articles show conclusively that there is a very legitimate field for the use of these mineral fillers, or more properly, *extenders*, in the manufacture of modern paints and varnishes. In fact, when one goes into the economics of painting, as outlined elsewhere in this issue, it is readily seen why it would be a waste of money not to take advantage of such "extenders."

This series of articles, which is really the first comprehensive and truthful exposition of the subject, should prove of the utmost value to the rock products industry in legitimately promoting the use of materials such as pulverized silica, limestone, etc. Also, the producers of these raw materials now have the satisfaction of knowing that they are producing a thoroughly legitimate article of commerce and a very important one to this growing modern paint industry.

Start Road Building Now

The Illinois State Highway authorities are still mulling over the bids received for state roadwork in February, which were summarily rejected as too high. Meanwhile, bids have been let for about 20 miles of concrete road in Cook County, Illinois, which includes the city of Chicago. The city newspapers are all advocating starting state road work at once.

Pennsylvania, Ohio and New York are already letting contracts. According to statistics compiled by the Portland Cement Association, about $900,000,000 is available for road work this year and there is every indication that it will be an excellent year for roadbuilding after things get going. It looks also as if things would be very slow getting started. Too many highway authorities are in the same frame of mind as the Illinois governor.

It seems a safe bet that highway builders who do not take advantage of the present lull in railway transportation to move sand, gravel, crushed stone and slag will encounter much the same conditions after July 1 or August 1 that existed last year. About that time the coal movement will start and *mineral aggregate men* know that there are no more open-top cars today, if there are so many, as there were last year. Enough said.

New Machinery and Equipment

Agricultural Limestone Machinery

By L. H. Sturtevant, Vice-Pres. and Gen. Mgr. Sturtevant Mill Co., Harrison Sq., Boston, Mass.

THE BENEFITS to the soil by the use of agricultural limestone are now universally recognized and thousands of tons are distributed regularly to the farmers in many sections of the country.

The kind of soil needing lime, the amount to be applied per acre, the fineness of the lime and the kind of machinery producing it has also become standardized so that now nothing remains to hinder this rapidly growing industry.

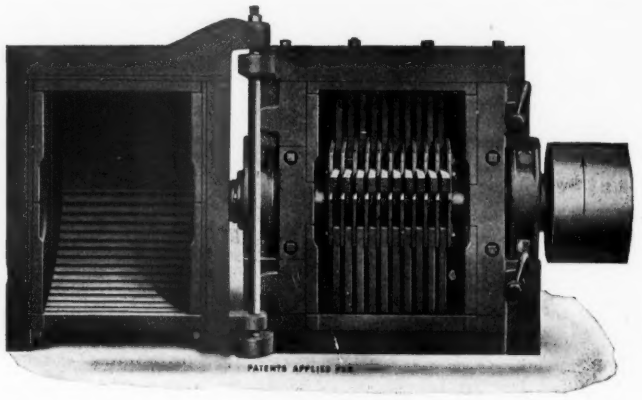
It is now strictly up to the machinery manufacturers to perfect their mechanisms so that ground limestone may be produced at minimum expense.

Simplicity, durability, quick accessibility, reasonable cost and minimum power are the principal points to be considered.

As this business is divided into three classes of producers, each requirement must be carefully considered so that the right machine will be purchased in each individual case. These classes are divided as follows: First, the large producer of agricultural lime, grinding hundreds of tons per day; second, the small producer who operates on a moderate scale of about 100 tons per day; third, the small grinder who wishes to produce limited quantities of limestone as a by-product or to run his machine intermittently as limestone is required.

The first class can afford to invest the necessary capital for a complete plant designed for quantity production, install dryers and the best of labor-saving equipment to produce at least cost. The second class in some cases can do likewise, but many times would prefer to limit the investment even if the ground stone costs more. The third class in practically all cases must install a plant at the lowest possible price, consistent with good machinery and manufacture as cheaply as it is possible under the circumstances.

There are two types of pulverizers well suited to this business—the ring-roll mill, which is in a class by itself for large outputs at low cost; a great big, slow speed, durable grinder, which one can install and forget, as far as wear, tear or trouble is concerned, and then there is the high-speed, swing-sledge, or hammer type of pulverizer, more widely used on account of its lower first cost and simplicity of plant.



The hammer-type mill

Of the two types of machines the one recommended entirely depends on conditions, each being first-class in every respect. The low-speed mill is the more durable, and also is more expensive and requires a screen, while the high-speed machine takes more power per ton of rock ground, and the upkeep expense is greater; it, however, needs no screen.

For the small producer the swing-sledge mill is without question the better of the two; for the large manufacturer the ring-roll is superior, but the man of medium requirements should look carefully into both types before reaching a decision.

Both machines are simple and easily operated. Both have the accessible open-door construction, through which replacements can quickly and easily be made, each has adjustments.

They differ greatly in principle, the ring-roll crushes the limestone on itself between ring and rolls, where it is held by centrifugal force. Ring and rolls do not touch each other, the crushing and grinding action is entirely by pressure exerted at slow speed against the limestone itself, which accounts for its extreme durability. The swing-sledge mill pulverizes by a series of tremendous blows delivered at lightning speed to the stone fed into it. Nothing can withstand such impacts, and the fine stone passes through grates at the bottom of the mill case. One can see at a glance that such a machine must necessarily wear considerably, but being armored, this wear is not excessive per ton of stone ground.

A proper decision therefore depends on many circumstances—capital, competition, output, operating expense, etc.

The ring-roll mill

New Non-Freezing Explosive

A NEW non-freezing explosive has been put on the market by the Atlas Powder Co., Philadelphia, Pa., which will make possible cold weather blasting.

Briefly, the claims made for the new non-freezing explosive may be stated as follows: (1) Five grades for every blasting requirement; (2) cannot freeze at any temperature; (3) withstands the heat of summer; (4) its stability avoids premature explosions (nothing weaker than a No. 6 Blasting Cap should be used to detonate it); (5) will not cause headaches to those who use and handle it; (6) made in all standard size cartridges.

Five Grades—This means that there is sufficient variety to meet every blasting requirement. In order to determine which is the proper grade for a particular piece of work, it is advised that the consumer consult with the Atlas Powder Co. and state exactly what the nature of the work is and what results are desired. The company's Service Division, which consists of men with expert knowledge and years of experience in the use of explosives, will recommend, after making careful investigation, the grade which will bring about maximum results.

Cannot Freeze—There is a volume of significance in this qualification. If the temperature of the atmosphere is 40 degrees or lower, a stick of dynamite be-

comes a dangerous substance. No one is fool-hardy enough to attempt to use chilled or frozen dynamite, until he has thawed it completely. Many hazardous methods of thawing dynamite are being followed by blasters. The most common is by setting the sticks on end in front of an open fire. Another is by placing the sticks in warm water. Other methods are to put the dynamite near or under stones or boilers, or on top of boilers. It is wrong even to suggest any of these methods, because they are extremely dangerous for reasons that are too numerous to mention. There is only one safe way of thawing frozen dynamite and that is in following the methods recommended by the explosive manufacturers.

"Cannot freeze," as applied to this new Atlas explosive, means an explosive which can neither be chilled nor frozen and which can be used and handled with no decrease in its effectiveness in weather when the temperature is below zero. All its qualities remain continually the same in the heat of summer as well as in the extreme cold of winter. Because of this fact, thawing or "doctoring" is not necessary and should not be attempted.

Motor-Truck Lubrication

By H. R. Totten, New York, N. Y.

WHY IS IT THAT SO MANY TRUCK OWNERS fall down in the matter of lubrication? Usually because the men who buy lubricating oil for motor trucks are company purchasing agents, managers or proprietors. They are good business men. They buy for long-run efficiency. They know the economics of their business and are vitally interested in any savings that can be effected. A motor truck is bought because it is expected to effect certain improvements and economies that will mount up in dollars earned and saved during the course of the year.

But the man who buys the truck usually knows comparatively little about engines or mechanism. He does not realize that the reasons why he operates motor trucks are just the reasons why the truck should be correctly lubricated. Too often he does not understand the relationship between the oil he buys and the economical maintenance of the truck for which it is intended. He does not appreciate that truck efficiency and engine efficiency depend upon correct lubrication. Unwittingly he invites costly penalties.

Lubricants and Lubricants

To most truck owners, anything which gets by under the name of "lubricant" is considered suitable to grease the pathway of truck progress. This may sound like moonshine, but it is not. Any reliable automotive engineer will bear out the facts.

In buying oil for gasoline motor truck use there are two points of prime importance

1. The oil must be of a correct body to meet the mechanical conditions for which it is intended with scientific exactness.

2. It must be of the highest quality to insure ample protection between the moving metal surfaces after the oil has been distributed. Why are these important? The body of the oil is important because it must be adapted to the lubricating system of the truck. Engineers have classified lubricating systems under five main heads: Full force feed, force feed, force feed and splash, splash circulating, and splash.

Suppose a truck has full force feed lubrication. Here the oil is supplied by direct pressure to the main frictional points, including piston rings. Such a system permits the use of a relatively heavier oil, rich in lubricating quality. Again, if a truck has a lubricating system in which the oil pipes are exposed to the atmospheric temperatures, the cold test qualities of the lubricant must be taken into account. A cold-test oil is one that will not freeze under the atmospheric conditions of winter. If oil of incorrect body is used it rapidly works up past the piston rings into the combustion chamber. There it is burned with each explosion. Oil is used up rapidly. Excess carbon deposit results.

In addition, the gas mixture works down past the piston rings on each compression stroke. Gas goes to waste. On the power stroke the exploding fuel charges also work down past the piston rings. Gasoline is again wasted. Power is lost. Gasoline consumption mounts up. Gasoline economy and full power both demand oil which will correctly seal the piston rings in the motor.

Why is quality important? The cooling and lubricating systems of the engine are the chief elements in protecting it against excessive heat. But in addition, the destructive heat of friction—the destroyer of steel—must be overcome. This task falls to the oil film (less than the thickness of this page). If the oil wears out or breaks down under the heat of service it loses much of its lubricating efficiency and does not properly separate the moving metal parts.

Scored cylinder walls, scored pistons and broken piston rings result. And if the body of the oil is incorrect, the same results may follow even though the quality of the oil be of the highest.

The correct lubrication of the transmissions and differential are no less important than the correct lubrication of the engine. For years "grease" has been made to cover a multitude of transmission and differential lubricating conditions in a multitude of cars and trucks. The truck owner bought what was offered because no exact information was available—and trusted to good fortune that no damage would follow.

The results were as uncertain as the method. The transmission and differential gears perform in some instances a service more severe than that which falls upon any part of the power plant. They are the backbone of your truck. They carry the whole driving load of the truck—constantly. Every impulse of the engine must be carried through the transmission to the differential and thence to the rear wheels.

The transmission gears, in particular, must bear the additional strain of every gear change. In changing speeds the teeth of one gear are suddenly thrown into mesh with the teeth of another gear. The gears must mesh instantly and silently or undue wear will result. To withstand the strain of power transmission, the gears of your truck must be correctly lubricated. To correctly lubricate the rear construction of your truck the lubricant must be:

Of the highest lubricating efficiency. Of the correct body to meet the mechanical construction of the transmission and differential units. It must follow, coat, cushion and thoroughly lubricate the gears, allowing them to engage easily and to operate without noise.

To determine the correct lubricants for a truck, then, requires both scientific study and broad practical experience. Such knowledge and experience the truck user does not and cannot have as a rule.

What is the answer? How can the truck owner solve his lubrication problem? This is the way out. When you buy oil, make the dealer or salesman show you the recommendation of a reliable lubricant manufacturer that the grade of oil recommended meets the lubricating requirements of your type of truck engine with scientific exactness. Have it proved to your complete satisfaction by actual demonstration, if you will, that this oil will give maximum lubricating efficiency and lowest maintenance cost.

Don't be misled by oil tests. An actual service test with the oil being used in the crankcase of your truck or other trucks of similar make and model is the safest guide to correct lubrication. Don't be guided by price. It is dangerous. Pennies saved in buying lubricating oil jeopardize your gasoline dollars. They invite premature engine wear, heavy repair bills, and loss of time from service. Buy the grade of oil that is correct for your truck. It will pay you big dividends.

Buyer for Colored Rock Chips

CODES MARTIN, 205 Masonic Temple Bldg., Denver, Colo., wants to buy black and white quartz chips and colored stone chips for facing concrete blocks.

ROCK PRODUCTS has frequent inquiries of this kind, and producers of rock chips of this character for pebble dash, terrazzo and similar purposes are urged to communicate with the editor, so that their names and shipping points may be kept on file.

Crushed slag chips are used to a considerable extent for decorative purposes in concrete block and artificial stone. Those producing this variety slag are urged to notify the editor.

Accident Prevention

Quarry Cars and Haulage—II

(Prepared by the Engineering Department of the National Safety Council for Rock Products)

A GENERAL DISCUSSION of quarry cars and quarry transportation systems was begun in the last issue. The first article covered hand tram cars in detail.

Cars Operated by Mule or Locomotives

The larger size tram cars are often operated in trains of 4, 6, or even 12 cars, pulled by locomotives or by mules. These cars are in most respects like the usual hand tram car, but have means for coupling, and also buffers. The buffer may be formed by the extension of the frame of truck some 6 or 8 in. past car body or by the usual spring drawhead with a curved buffer, with a link and pin for coupling. Instead of the link and pin couplings, chains attached to sides of car body or just underneath the body on the side may be satisfactory on straight track. On curved track, however, their use is discouraged by the National Safety Council. When chains are used, closed rings or links instead of hooks are recommended, because when released the dragging chain will not catch on the projects of track as may be the case if the chain is provided with a hook.

Probably a better type of car for this service is the side-dump car. This eliminates the troubles of end-dump and turntable cars. These cars may be easily dumped by means of lever placed on side of car opposite the door.

Cars Operated by Motor Haulage

Cars for motor haulage should, of course, be built with special emphasis on their strength, and with particular care that they are provided with suitable bumpers, and means for making safe couplings.

The gable dumping cars or cars with gable bottom and side dumping doors are considered best for motor haulage in metal mines. These cars are ordinarily of larger size, holding from 4 to 6 tons each. These are usually dumped into hoppers or pockets. With the gable bottom cars it is important to have an easy and quick means of operating the dump cars. The handles for operating the dump doors are necessarily at the end, as cars dump to both sides of track.

Another type of car which is gaining in popularity is the rocker car which dumps by rolling on end bearings. The rack on supporting frame, instead of being toothed should have holes in which pins on car body segment engage; this will permit dirt to fall through. The rocker type cars are particularly popular because they have no doors or latches and therefore permit no leakage of ore in mine haulage ways. The cars are now made low and where the track gauge can be made comparatively broad they should give very satisfactory service.

Car Appurtenances

Bumper—The car bumper has a far-reaching effect on the safe operation as well as upon the life of the car it has been found by the National Safety Council. The mining laws of several states prescribe the length of the bumper beyond the end of car body. Seven inches is considered the minimum requirement for length of bumper; this will allow 14 in. between car bodies on a straight track. Of course, on curved track the clearance will be reduced according to the radius of the curve. The circular bumper in center of car is considered by the National Safety Council the most advantageous in that the bumpers do not interfere on curves and also they allow clearance for men making couplings.

The projection on motor bumpers, extending above the bumper proper, serves as a safeguard for motormen. This should always be provided and kept in proper repair, because without this protection, cars may override the bumper and crush the motorman.

Couplers—Probably the greatest number of haulage accidents occur while making couplings. Automatic couplers, though said not to have met with success in many mines, do undoubtedly reduce the hazard in making couplings, and would seem to add much to efficiency in operation. The failure of the automatic coupler is said to be largely due to unevenness of track conditions; therefore, with level, well-kept tracks, they should give satisfaction. Where the automatic coupler is out of the question, use link and pin couplings, not hooks. The coupler should not hang between the bumpers and should permit coupling when the cars are standing still. If it is necessary to move the cars to make a coupling the danger is greatly increased. Trainmen should be prohibited from coupling or uncoupling cars in motion.

In the use of the link and pin coupling, it is of decided advantage to provide a pin having a large ring in the top, or an extension above the flange, which may be used as a handle, without danger of getting fingers pinched.

For motor haulage a long chain coupling is not as desirable as a short link coupling, because of the possibility of chains being broken as motor starts up with loaded train. There is less violent jerking with the short coupling, consequently less material will be spilled along track.

Car Brakes

The use of sprags and stop-blocks (hand placed) is general in most coal mines. With the use of sprags or blocks there is always danger of workman having hand pinched or run over, or even of his falling underneath or between cars. For haulage through the quarries, brakes would seem to be a more satisfactory and safer method for controlling movement of the cars, and there is little doubt in the minds of most safety engineers and quarry superintendents that the safer practice is to equip all cars with an efficient brake. Brakes can be easily and quickly set on cars with little danger to trip riders.

The brake lever should be at the side instead of end of car and should be arranged so that brake may be applied by pushing down on lever rather than pulling sideways. Some operators, however, prefer the brake lever at end of car placed near the side so that it may be easily reached. The brake lever handle should always be kept below the top of car.

One company which has all its cars equipped with brakes, advised that they have proven very satisfactory and the type of brake used can be easily and quickly applied by one brakeman and will lock all four wheels of the car.

Special Cars

Man-Trip Cars—The practice of workmen riding in quarry cars has often been the cause of serious accidents, therefore, where men are hauled to places of work, it is suggested that man-trip cars be provided for taking workmen into and out of the mine. Seats are provided on each side for the workmen, and a cover overhead, made of strap iron covered with wire netting, protects the workmen from contact with trolley wire or projections in roof. A wooden frame-work with slats, or perhaps with burlap or duck, would provide surer protection against electric shock. The use of such cars is not only convenient, but greatly reduces the possibility of accident to workmen, and also the number of workmen traveling on foot in the haulage-ways. An insulating bumper is used by some companies between the motor and first car on man trip, for protection against electric shock.

Powder Car—Many companies now provide cars of special construction for hauling powder, and do not permit powder to be hauled in the rock cars. These powder cars should be made entirely of wood (except the truck), or else lined throughout with wood. A tight-fitting cover should be provided to keep the powder dry and prevent possibility of sparks getting to it.

Small Building Developments in the East Continue

March Shipments of Cement Double January Figures—All Factors of Building Industry Report Healthful Conditions Developing

ECONOMIC STRAWS in the building construction industry are attaining a more uniform direction, says the Dow Service Daily Building Reports.

The movement of basic building materials in the last two weeks wipes away all doubt as to the contractional character of 1921. In the first fifteen days of January this year shipments of cement out of the district supplying this market totalled 20,000 barrels a day. The same number of days in February developed shipments of 23,000 barrels. The same number of days in March developed 42,000 barrels a day.

The movement in structural steel is even better than it was in 1919, which is more comparable than was March, 1920, for the identical month. The records of the Bridge Builders and Structural Society, from reports gathered by its secretary, George E. Gifford, shows that during the month of February, 1921, 25,600 tons of fabricated structural steel were contracted for throughout the United States, equivalent to 14 per cent of the entire capacity of the bridge and structural shops of the country. In the same month, 1919, the total was 12½ per cent with railroads fairly active in the market. February of last year recorded 95 per cent of capacity taken, however.

Common brick is passing out of reserve stocks rapidly and moving into actual construction work.

Labor difficulties in the brick yard are expected to develop as producers attempt to bring down manufacturing costs by altering wage scales ruling last year which, with coal at premium prices, forced brick quotations to excessive levels. This prospect may interfere with brick production so that existing stocks will not be rushed to this market early this spring without pretty definite call. There is about 200,000,000 brick on hand in manufacturers' sheds for New York requirements until July. This quantity is far below normal reserve.

Lumber, suitable for home building, has dropped 60 per cent from the price peak and is now only about 25 per cent above the pre-war delivered prices.

Sanitary tile manufacturers turned their plant capacity on full. Most of the manufacturers now have orders on their books that will take care of plant capacities for a year or more, and, according to N. E. Loomis, secretary of the Mosaic Tile Company, production in this department will be increased 20 per cent over that of last year and even then, he says, the demand now developing will not be fully met. This view is supported by Emil Kohler, president of the American Encaustic Tiling Company, Ltd., who believes that the era of habitation building is already felt in his industry and his factories are swamped with orders.

The window and plate glass departments say that the change in temperament of the building market has been felt to a noticeable degree within the last few weeks. Plate glass prices have been cut in half since last November.

The entire paint department is feeling the impetus, although the volume of orders placed is below last year's records so far, owing to the fact that ship yard requirements have dropped to nothing and railroad ordering is nil. Practically the entire suspension of the paint market centers upon home building and repair and multi-family housing projects which is already sufficient in small-quantity volume to warrant manufacturers' assurances to the trade that there will be no more price reductions this year.

The labor situation in the building trades is quiet. No agreements are pending and none expires for some time, indicating that those starting construction work this spring will be able to discount the factors of strikes and lock-outs of any consequence.

An economic vacuum in the labor market is developing wherein certain artisans will find themselves in idleness. This condition arises from the heavy volume of commercial construction projected and entered into late in the 1920 building season which jobs are just now nearing completion. When prices of materials and labor reached their peak last autumn, new projects of the size and type now being completed were temporarily abandoned. Since prices have come down, many of these projects are being revived, but the period of their inactivity last year will be carried forward into the labor market and construction field this year.

These artisans would be facing a long period of unemployment, were it not a fact that, quite unexpectedly, a turn came in the building market some few weeks ago and is now quite general, calling for a great quantity of small building development. Toward these jobs artisans heretofore employed only on large commercial or apartment projects are looking for sustenance during the next few months or until the commercial, or big-work projects again bid for their services.

There is a decided turn in public investment preference back to the mortgage market, according to accredited authorities and this factor also is having a bearing upon the impetus given to early 1921 building projects.

Oklahoma Has State Cement Plant "Bug"

A RESOLUTION was introduced in the Oklahoma State Legislature on March 5 by Senator Briggs to start an investigation of the feasibility of the State owning and operating its own portland cement plant. The proposal is to use convict labor for the operation of such a plant.

Senator Briggs' resolution proposes a commission consisting of the president of the State Board of Agriculture, the Highway Commissioner, and the chairman of the State Board of Affairs.

Building Outlook in Southern Indiana and Northern Kentucky

MANY OF THE CITIES and towns in Southern Indiana have large building programs for the coming Spring and Summer. Lumber prices are lower and contractors say they look for a reduction in prices of cement, lime, stone, brick, and other building materials. While they are not looking for a sensational decline in price, they say that these materials will be cheaper than they were last year. It is pointed out that few building materials during the past few years advanced as far as lumber and therefore the decline in these is not expected to be as great as lumber.

Mayor Benjamin Bosse of Evansville, Ind., announced a few days ago that he hoped to arrange a conference within a short time between contractors and building materials men on one hand and members of the building trades crafts on the other to see if he could not work out a reduction in prices of materials and wages so that building would boom in Evansville during the coming Summer. It is said that while lumber has been reduced materially that sand and gravel and other building materials are still high; in fact, so high that building is being retarded. James Nugent, of the Bedford and Nugent Sand and Gravel Co., of Evansville, in commenting on the move of Mayor Bosse said that he is willing to consider a cut. The largest brick manufacturing company in Evansville announced a cut of 25 per cent in the price of brick a few days ago.

Business with the stone quarries in Western and Central Kentucky is expected to be fairly good during the coming season and quarry men are looking for a larger volume of business than they enjoyed last year. Building operations are picking up some. At Bowling Green, Ky., the biggest building boom in the history of that city is anticipated owing to the activity in the oilfields of Barren and McLean counties.

General Market News

Conditions in the Lehigh Valley Cement District

OPERATIONS in the cement district of the Lehigh Valley section of Pennsylvania are showing a gradual, steady trend towards improvement. There is no great movement for concerted resumption of production at normal, but one by one the different mills are falling in line, and the wheels are commencing to turn. Despite the curtailment in construction operations, there has been a little demand for material right along, and with stocks now at a very low point, current output, primarily, is for the purpose of replenishing the depleted reserves.

The labor situation is decidedly "easy" and all available help required is readily obtainab'e. With lower wages in effect, as recently announced in ROCK PRODUCTS, there is a noticeable betterment in the "day's work," and the average employe is now striving towards greater efficiency, well knowing that there is another worker to fill his place if the management deems advisable.

Market conditions in the eastern districts show a decided sameness. The demand for the material is now becoming visible "on paper," carrying an indication that estimates and inquiries are forerunners of Spring and Summer activities when cement is expected to resume its status as a needed requisite of building operations. Prices hold firm at recently established levels and all appearances tend to show that prevailing figures will prevail for some time to come, probably well into the Summer, and any fluctuations will be slight. Dealers at New York are asking $4.10 a barrel delivered, making a net of $3.10 with bag rebate. In Boston, a $5 figure holds, with rebate of 25 cents each for bags, or a total of $1 per barrel. In paper, the quotations stand at $4.40 a barrel on the job. The same quotation maintains at Providence, R. I., with bag allowance of 22½ cents. In the New Jersey districts, as Newark and Trenton, dealers are holding closely to New York City prices, while through the state a fair average is from $4.20 to $4.30 per barrel. Philadelphia, Pa., is turning the material at $4.50 a barrel, including bags.

The Lehigh Portland Cement Co. has four of its mills in the Lehigh Valley district in operation at the present time, the last plant to resume being Mill A at Ormrod. Mill F in this same section is another of the plants now operating, while Mill D here is still idle. The two Ormrod plants are supplemented by the mills at Fogelsville and West Coplay. These two latter plants give employment to about 600 operatives. The mills are being run on a full-time basis and a large percentage of the output is being placed in stock.

The Alpha Portland Cement Co. is operating its Mills No. 3 and 4 at Martin's Creek, following several weeks of idleness. In this time a new power plant has been constructed at the No. 3 plant, with installation including a 5,000 kilowatt turbo-generator. A full working force is being employed at these plants. The company has completed plans for the erection of a new one-story building at Jamesville, N. Y., 20x120 feet, to be used for storage service. The structure will be of reinforced concrete. The Atlas Portland Cement Co. is operating at some of its local plants under a general curtailment schedule.

The importance of the Lehigh Valley district as a cement producer is becoming more and more pronounced, and is demonstrated forcibly by the recently issued figures of the Geological Survey, Washington, covering output for 1920. It is shown by the tabulations that this section manufactured 25 per cent of the country's total of 100,302,000 barrels, while the entire state stands at 28 per cent, or three per cent for districts outside. At a recent meeting of the Giant Portland Cement Co., all directors were re-elected for the coming year.

South Dakota Figuring on New State Cement Plant

PAUL E. BELLAMY, member of the South Dakota State Cement Commission, informs ROCK PRODUCTS that the commission is contemplating the erection of a state-owned and operated cement plant near Rapid City. The definite policy of the commission has not yet been determined. The condition of the metal and machinery markets will have considerable bearing upon determining that policy. Mr. Bellamy writes:

"We are planning to build a plant of 2000 bbls. per day capacity, using a very crystalline limestone and a satisfactory shale. Both are available without any stripping of the overburden, and the plant can be located near the limestone deposit in such a manner that the limestone can be delivered to the crusher from the quarry by gravity. Artesian water is available in unlimited quantities.

"The commission has authority to issue two million dollars' worth of state bonds to obtain the necessary funds for building the plant. As you will note by the enclosed report, the preliminary investigation, estimates, etc., have been worked out. Numerous engineers have been consulted but none employed as yet. The writer is in active charge of the work of the commission."

It has been previously reported in ROCK PRODUCTS that the state proposed to purchase the new cement plant of the Black Hills Rock Products Co., now nearing completion at Rapid City, but the owners of this plant did not agree to the deal.

The report of the commission, which accompanies the letter of Mr. Bellamy, states that a 2000-bbl. plant "could be built and equipped, including site and operating capital, for about $2,000,000 under August, 1920, prices of materials and machinery. That under efficient management a first-class grade of cement could be manufactured in a state plant and delivered all over the state in proportion of one barrel per capita of population at $2.38 per bbl., f.o.b. destination, based on figures compiled in August, 1920, and including a depreciation charge sufficient to maintain the plant perpetually in operating condition and a sinking fund charge sufficient to wipe out the investment in 20 years, and an interest charge on the investment at 6 per cent until the investment is liquidated."

Indiana Cut-Stone Men Meet

STONE CONTRACTORS and quarrymen from a number of large cities in the United States, who attended the annual executive board meeting of the International Cut-Stone Contractors' and Quarrymen's Association recently in Indianapolis, do not anticipate large reductions in the price of stone and decorative building materials, due to the high freight rates and high labor cost. They assert that labor alone is responsible for from 70 to 75 per cent of the cost of construction work, and that the gradual reduction in construction work has been due to a response to public appeal rather than to a drop in the price of materials used.

Serious lack of employment among skilled stoneworkers, unfair foreign competitive shipping rates and the mounting costs of maintenance were subjects discussed at the meeting. It was pointed out that stone shipped from England is cheaper than the Indiana product because of widely different rates. The railroad situation was summed up in a report that declared the number of employes in many places had been increased more than six per cent at war-time scales in the face of decreased shipments. It was said that only 11 per cent of the skilled stoneworkers in America are employed steadily at present.

General Market News

Railways Will Not Reduce Rates on Iron Ore

THE HEARING before the Interstate Commerce Commission on Lake Superior ore freights, set for March 12 at Chicago, has been indefinitely postponed by the commission. Eighty-seven iron mining companies in Michigan, Minnesota and Wisconsin have requested the commission to investigate the rate schedules from June 25, 1918, to date, and to fix such a new rate as will net the carriers 6 per cent upon the value of the property utilized in ore hauling.

The commission has declined to suspend the increase of 10c per ton for mine-to-dock haul and 5c per ton dock charge put into effect by six of the railroads handling ore from the Michigan and Wisconsin ranges, despite the appeal of thirty-six independent ore producers in these districts.

Oklahoma Reduces Freight Rates on Road-Building Materials

IN A RECENT ORDER the Oklahoma Corporation Commission continues its temporary order of last year permitting the railways of the state to charge the 35 per cent advance allowed by the Interstate Commerce Commission on August 26, 1920. The new order continues the advanced rates until June 1 with the exception of the rates on sand, gravel, crushed stone, etc., which are reduced 35 per cent, or to their former level before the I. C. C. order of August 26, 1920.

The order of the Oklahoma commission states: "We feel that refusing to continue in effect the 35 per cent increase on road building material is not only in the interest of the public, but to the interest of the carriers as well, as they are shown to have idle equipment and to be badly in need of tonnage, and we believe the carriers will accept this reduction without contest. We also feel that reduction in two and three line arbitraries is thoroughly justified and will be acceded to by the carriers."

Quarry Operations by Motion Pictures

H. S. BRIGHTLY, secretary of the Bedford Stone Club, the limestone quarrymen's association of Indiana, recently gave an illustrated lecture with motion pictures at Indianapolis.

The quarrying and milling operations were shown step by step from the ledge of stone on the hillside to the finished product loaded on the cars for shipment. The moving pictures showed men and machinery at work with the stone in the quarry yards, the stacking yards and the cut-stone plant; they showed the various kinds of saws, steam shovels, chopping engines and electric channelers at work, and illustrated the methods of storing, loading and unloading.

Specifications for Washed Gravel Railway Ballast

THE AMERICAN RAILWAY ENGINEERING ASSOCIATION has adopted as standard the following specifications for washed gravel ballast:

1. Gravel for ballast shall be so prepared that dust, loam and dirt are removed, that all aggregates that will not in any position pass through a 2½-in. ring are rejected; and that the sand contained in the ballast shall not, in volume, exceed 20 per cent nor be less than 15 per cent of the material as loaded for use.

Test No. 1. Dust, Dirt or Loam

2. A sample of the prepared ballast containing one-eighth cubic foot shall be placed in a water-tight receptacle having a capacity of not less than one cubic foot. Into this receptacle shall then be placed two quarts of clear water, after which the receptacle shall be agitated until the gravel is thoroughly washed. The water shall be drained off immediately and placed in a glass jar and allowed to settle. If the sediment deposited in the bottom of the jar is more than one-half of one per cent of the volume of sample the output of the plant shall be rejected until the fault has been corrected.

Test No. 2. Large Aggregate

3. A sample weighing not less than 150 pounds shall be placed in or on a screen having round holes 2¾ inches in diameter. If a thorough agitation of the screen fails to pass through the screen 98 per cent of the material, as determined by weight, the output from the plant shall be rejected until the fault has been corrected.

Test No. 3. Sand

4. One cubic foot of the prepared ballast shall be thoroughly dried, placed in a screen having 10 meshes to the inch and the screen agitated till all particles which will pass have passed the screen. If the material which passes through the screen exceeds 20 per cent or is less than 15 per cent in volume of the original sample the output shall be rejected until the fault has been corrected.

5. In case inspection develops the fact that the material which has been or is being loaded is not in accordance with the specifications, the inspector shall notify the manufacturer to stop further loading until the fault has been corrected, and to dispose of all defective material that had been loaded in cars, which shall be done at the expense of the contractor.

6. When ballast is being paid for by the ton, and it is impracticable to weigh each car, the weight per yard shall be obtained by weighing at frequent intervals not less than five cars loaded with ballast, the contents of which have been carefully measured. The weight per yard obtained by such a test shall be used in figuring the weight per car until another test is made.

7. When ballast is paid for by the yard, the amount shall be determined by weighing each car, where practicable, and applying the weight per yard as determined by frequent tests. When impracticable to weigh each car, the contents of each car will be carefully estimated by comparison with cars, the contents of which have been actually measured.

Missouri Association Furnishes Members With Railway Rate Files

THE SECRETARY of the Missouri Valley Association of Sand and Gravel Producers, F. A. Laughead, Kansas City, Mo., has compiled 8000 railway rates on sand and gravel shipped from various producing points in Western Missouri and Eastern Kansas. These have been furnished to members of the association in the form of card files. Of course only those rates in which the particular producer is interested are included in any one file. Nevertheless this meant 20,000 cards as a starter, which the association has already made out.

In making out the cards red figures were used to indicate rates in cents per ton and black figures rates in cents per hundred pounds, according to the railway's tariffs.

Big Rate Case Coming

In his letter announcing the sending out of these rate files, Mr. Laughead states:

"This work, just about completed, was the first undertaking of our newly organized traffic department. It has been a big job and we hope well done. Following this, work will be started on the preparation of our big rate case, another undertaking that will require an immense amount of work and effort.

"Since the organization of this department, it has handled complaints for eight individual companies in the nature of claims, switching charges, demurrage charges, rate matters, etc.; prepared complaint to be filed with the Interstate Commerce Commission against the recent ruling on frozen loading; and succeeded in having eliminated ruling of the W. T. L. Committee requiring shippers to pay freight charges on that portion of overloads removed at scaling points where cars are weighed enroute."

Sand and Gravel Executive Committee Meets

THE EXECUTIVE COMMITTEE of the National Association of Sand and Gravel Producers met in St. Louis, Mo., March 8, to start a unified campaign by producers of sand, gravel and crushed stone, together with other interests in building material lines, for better transportation facilities and reduced freight rates for all building materials.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.00	1.50	1.50	1.50	
Buffalo, N. Y.			1.35 per net ton, all sizes			
Burlington, Vt.	**1.00**		**2.50**	**2.00**	**2.00**	
Califon, N. J.	**1.80**	**2.25**	**2.00**	**1.80**	**1.80**	
Chaumont, N. Y.	1.75	1.75	1.75	1.50	1.50	1.50
Coldwater, N. Y.	**1.80**	**1.80**	**1.80**	**1.65**	**1.65**	**2.00@2.25‖**
Grove, Md.	**1.45**	**2.50**	**2.40**	**2.00**	**1.60**	**1.45**
North Leroy and Akron, N. Y.	.80@1.35	1.35	1.35	1.35	1.35	1.35
Munns, N. Y.			All sizes 1.50			
Redington, Pa. (dolomite)	1.35		1.85	1.85	1.85	1.85
Utica, N. Y.	**1.00**		**All other sizes 1.50**			
CENTRAL						
Alden, Ia.	.80@1.00	.80@1.00	1.50	1.45		
Alton, Ill.	2.25	2.25	1.75	1.75		
Bettendorf, Ia.			**All sizes, 2.00 cu. yd.**			
Buffalo, Ia.		1.35	1.45	1.25	1.25	1.35
Chicago, Ill.	1.41	2.00	1.53	1.41	1.41	1.41
Cincinnati, Ohio		**2.00**	**2.00**	**2.00**		
Cleveland, Ohio		**2.40**	**2.20**	**2.20**		
Columbia, Ill.	**2.15**	**1.90**	**2.00**	**2.00**	**1.90**	**1.90**
Coralville, Ia.	1.25	1.65	1.65	1.50	1.40	
Davenport, Ia.	**1.50•**	**1.50•**	**1.50•**	**1.50•**		
Dundas, Ont.	1.00	1.50	1.50	1.50	1.25	1.20
Eden and Knowles, Wis.	1.30	1.30	1.30	1.30	1.30	
Greencastle, Ind.	1.50	1.40	1.25	1.25	1.25	1.25
Illinois, Southern	2.00	1.75	1.75	1.75	1.75	
Kokomo, Ind.	1.10	1.10	1.25	1.20	1.10	1.10
Krause or Columbia, Ill.	1.80	1.30	1.50	1.40	1.30	1.30
Lannon, Wis.	1.00	1.10	1.10	1.10	1.10	1.10
Lima, Ohio	1.70	1.60	1.50	1.50	1.50	1.50
Linwood, Ia.	**1.00**		**1.45**	**1.25**	**1.25**	
Marblehead and Brillion, Wis.	1.10		1.20	1.10	1.10	
Mayville, Wis.	**.95@1.00**		**1.20**	**1.20**	**1.20**	**1.20**
Montrose, Ia.	1.35	1.75	1.75@1.85	1.75	1.65@1.75	
Oshkosh, Wis.			1.40 per ton, all sizes			
River Rouge, Mich.	**1.25**	**1.50**	**1.50**	**1.50**	**1.25**	**1.25**
St. Louis, Mo.	**.60**	**1.60**				
Sheboygan, Wis.	1.30	1.30	1.30	1.30	1.30	1.30
Stolle, Ill. (I. C. R. R.)	2.25		1.75	1.75	1.75	1.75
Stone City, Ia.	.80		1.60	1.50	1.40	
Toledo, Ohio, f. o. b. cars	**1.85**	**2.10**	**2.10**	**2.10**	**1.85**	**1.85**
Toronto, Canada	1.90	2.40	2.40	2.40	2.15	2.15
SOUTHERN:			These prices include 90c freight			
Cartersville, Ga.		1.85		1.75	1.75	1.65
Chickamauga, Tenn.	1.50	1.75	1.75	1.75	1.75	1.75
Columbia, S. C.	1.00@1.25	3.50	3.50	3.50		
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	
Fort Springs, W. Va.	1.45	1.60	1.80	1.65	1.45	
Garnett, Okla.	.50		1.60	1.60	1.45	
Ladds, Ga.	1.75	1.75	1.75	2.00	2.00	
Mascot, Tenn.		**1.50**	**2.00**		**1.50@2.00**	
New Braunfels, Tex.	.60	1.50	1.50	1.25	1.25	1.25
WESTERN:						
Atchison, Kans.	.50	2.10	2.10	2.10	2.10	2.10
Blue Springs and Wymore, Neb.	.20	1.65	1.65	1.60@1.65	1.45@1.50	1.40
Cape Girardeau, Mo.	1.50		1.50	1.50	1.25	
Kansas City, Mo.	1.00	2.00				
Duluth, Minn.	**1.00**	**2.25**	**2.00**	**1.50**	**1.50**	**1.50**

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Baltimore, Md.	1.25	2.50	2.35	2.25	2.00@2.25	2.00
Bernardsville, N. J.	**2.00**	**2.20**	**2.00**	**1.80**	**1.50**	
Branford, Conn.	**.80**	**1.75**	**1.65**	**1.45**	**1.25**	
Birdsboro, Pa.	**1.40**	**1.90**	**1.80**	**1.60**	**1.60**	**1.40**
Bound Brook, N. J.	2.00	2.30	2.10	1.75	1.75	
Dresser Jct., Wis.	1.00	2.45	2.45	2.15	2.00	2.00
Dwight Station, Calif.			.75@1.00—all sizes			
E. Summit, N. J.	2.10	2.35	2.15	1.75	1.85	
Glen Mills and Rock Hill, Pa.	1.70	2.35	2.05	1.90	1.95	1.80
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60@1.00	1.60@1.80	1.60@1.80	1.40@1.50	1.20@1.30	
Oakland, Calif.	*1.50	*1.50	*1.50	*1.50	*1.50	*1.50
Richmond, Calif.	.50*		1.75*	1.50*	1.50*	
San Diego, Calif.	.50@ .70	1.45@1.75	1.40@1.70	1.30@1.60	1.25@1.55	1.25@1.55
Springfield, N. J.	2.15	2.35	2.15	2.00	1.85	1.75
Westfield, Mass.	**.60**	**1.35**	1.30	1.20	1.10	
Winchester, Mass.	.85	2.10	1.85	1.60	1.60	1.60

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Baltimore, Md.—Gneiss	1.00	2.75	2.40	2.20	2.10	1.75
Columbia, S. C.—Granite	.75		2.75	2.50	2.35	
Dundas, Ont.—Flint	1.10	1.10	1.10	1.10	1.10	1.10
W. Barre, Pa.—Quartzite	.90	1.70	1.55	1.20	1.20	1.10
Holton, Ga.—Granite	.40		2.50	2.25	2.25	2.00
Little Falls, N. Y.—Syenite	1.40	1.80	1.70	1.60	1.60	1.50
Los Angeles, Cal.—Granite		1.25@1.50	1.15@1.40	1.15@1.40		
Middlebrook, Mo.—Granite	**4.00**		**2.00**	**2.00**		**1.50‡**
Stockbridge, Ga.—Granite	**.50**	**2 00**	**1.90**	**1.75**	**1.75**	
White Haven, Pa.—Sandstone	1.20	2 00	2.00	1.70	1.70	1.70

•Cubic yard. †Agrl. lime. ‖R. R. ballast. ‡Flux §Rip-rap. a 3-inch and less.

Agricultural Limestone

EASTERN:

Coldwater, N. Y. — Analysis, 56.77% $CaCO_3$, 41.74% $MgCO_3$—70% thru 200 mesh, 95% thru 40 mesh; bags, 5.00; bulk 3.25

Chaumont, N. Y. — Analysis, 95% $CaCO_3$, 1.14% $MgCO_3$ — Thru 100 mesh; sacks, 4.50; bulk 2.75

Gasport, N. Y. — 90% thru 50 mesh; bags, 4.25; bulk 2.50

Grove City, Pa. — Analysis, 94.75% $CaCO_3$, 1.20% $MgCO_3$ — 70% thru 100 mesh; 80 lb. ppr., 5.50; bulk..... 4.50

Grove, Md.—50% thru 50 mesh; paper bags, 6.50; bulk..... 4.50

Hillsville, Pa.—Analysis, 96% $CaCO_3$ —70% thru 100 mesh; sacks, 5.00; bulk 3.25

Jamesville, N. Y. — Analysis, 89.25% $CaCO_3$, 5.25% $MgCO_3$; sacks, 4.50; bulk 2.75

New Castle, Pa.—85% $CaCO_3$, 1.4% $MgCO_3$—75% thru 100 mesh, 84% thru 50 mesh, 100% thru 4 mesh; sacks, 5.00; bulk 3.25

Syracuse, N. Y. — Analysis, 90% carbonates—50% thru 100 mesh, 90% thru 50 mesh; sacks, 3.50; bulk..... 2.75

Texas, Md.—Analysis, 58.02% $CaCO_3$, 37.3% $MgCO_3$—50% thru 50 mesh; bags, 4.25; bulk 2.50

Walford, Pa. — 50% thru 100 mesh, 60% thru 50 mesh, 100% thru 10 mesh; sacks, 5.00; bulk..... 3.25

West Stockbridge, Mass., Danbury, Conn., North Pownal, Vt.—Analysis, 90% $CaCO_3$ — 90% thru 100 mesh; paper bags, 6.25—90% thru 50 mesh; paper bags, 5.25; bulk 3.25

Williamsport, Pa. — Analysis, 88-90% $CaCO_3$, 3-4% $MgCO_3$—50% thru 50 mesh; bulk ..... 4.00@5.50

CENTRAL:

Alden, Ia.—Analysis, 99.16% $CaCO_3$.... .80

Alton, Ill. — Analysis, 96% $CaCO_3$, 0.75% $MgCO_3$—50% thru 4 mesh.... 4.50

Pulverized limestone 2.00

Bedford, Ind. — Analysis, equivalent 98.5% $CaCO_3$—90% thru 100 mesh.. 1.60@2.00

Belleville, Ont. — Analysis, 90.9% $CaCO_3$, 1.15% $MgCO_3$—45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk 2.50

Cape Girardeau, Mo.—50% thru 4 mesh 1.50,

Chicago, Ill.—Analysis, 53.63% $CaCO_3$, 37.51% $MgCO_3$—90% thru 4 mesh.... 1.50

Columbia, Ill., near East St. Louis—⅛-in. down ..... 1.25@1.80

Detroit, Mich.—Analysis, 88% $CaCO_3$, 7% $MgCO_3$—75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh..... 1.80@3.80

Elmhurst, Ill. — Analysis, 35.73% $CaCO_3$, 20.69% $MgCO_3$—50% thru 50 mesh 1.25

Greencastle, Ind. — Analysis, 98% $CaCO_3$—50% thru 50 mesh..... 2.00

Howenstein, O.—100% thru 10 mesh, 59% thru 50 mesh, 39% thru 100 mesh 2.75@3.00

Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$—90% thru 50 mesh..... 2.00

Marblehead, O. — Analysis, 95.33% $CaCO_3$—100% thru 100 mesh; sacks, 5.25; bulk 3.00

Mayville, Wis.—Analysis, 53.65% $CaCO_3$, 43.72% $MgCO_3$ ..... 1.75@2.00

McCook, Ill.—Analysis, 54.10% $CaCO_3$, 45.04% $MgCO_3$—100% thru ¼-in. sieve, 78.12% thru No. 10, 53.29% thru No. 20, 38.14% thru No. 30, 34.86% thru No. 50, 22% thru 100 1.50

Milltown, Ind.—Analysis, 91.59% $CaCO_3$, 4.87% $MgCO_3$ — 24% thru 200 mesh, 33.6% thru 100 mesh, 40% thru 50 mesh, 50% thru 40 mesh, 70% thru 20 mesh..... 1.65

Montrose, Ia.—90% thru 100 mesh..... 1.25

Narlo, O.—Analysis, 56% $CaCO_3$, 43% $MgCO_3$ 1.25

Piqua, O. — Analysis, 82.8% $CaCO_3$, 8.2% $MgCO_3$; neutralizing power in terms of calcium carbonate, 95.3%—50% thru 100 mesh..... 3.50@5.50

50% thru 50 mesh..... 1.75@2.00

Ridgeville, Ind.—Analysis, 98% $CaCO_3$ 100% thru 4 mesh..... 1.75

River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk..... .80@1.40

Stolle, Ill., near East St. Louis on I. C. R. R. — Thru ½-in. mesh — Analysis, 89.61% to 89.91% $CaCO_3$, 3.82% $MgCO_3$ 2.25

Stone City, Ia.—Analysis, 98% $CaCO_3$ —90% thru 50 mesh ..... .80

(Continued on next page.)

Agricultural Limestone

(Continued from preceding page.)

Toledo, O.—Analysis, 52.72% $CaCO_3$, 43% $MgCO_3$—20% thru 100 mesh, 30% thru 50 mesh, 80% thru 100 mesh, 100% thru 5/32 screen 1.80
Whitehill, Ill. — Analysis, 97.12% $CaCO_3$, 2.50% $MgCO_3$ — 90% thru 100 mesh 5.00
50% thru 50 mesh 2.00
Yellow Springs, O.—Analysis, 96.08% $CaCO_3$, .63% $MgCO_3$—32% thru 100 mesh, 58% thru 50 mesh, 99% thru 10 mesh; sacks, 8.25 ..... 5.25
SOUTHERN:
Blowers, Fla.—Analysis, 98% combined carbonates; bulk 5.25
Cartersville, Ga.—Analysis, 96% combined carbonates — pulverized limestone ..... 1.75@2.00
Claremont, Va. (Marlime) — Analysis, 90.94% $CaCO_3$, 0.31% P., 1.36% Mg., 0.37% K.; 100 lb. paper bags, 6.00; 100 lb. cloth bags, 6.50; bulk ..... 3.50@4.50
Dittlinger, Tex. — Analysis, 99.09% $CaCO_3$, .04% $MgCO_3$—90% thru 100 mesh ..... 2.00@3.00
90% thru 4 mesh ..... 1.00@2.00
Grovania, Ga.—Analysis, 95% $CaCO_3$, no $MgCO_3$—50% thru 100 mesh 2.50
Hopkinsville, Ky. — Analysis, 94.6 to 98.1% $CaCO_3$; bulk 2.00
Knoxville, Tenn.—Pulverized 2.50
90% thru 100 mesh 2.00
90% thru 50 mesh 1.50
Ladds, Ga.—Pulverized limestone 2.50
Linnville Falls, N. C.—Analysis,, 53% $CaCO_3$; 42% $MgCO_3$—50% thru 100 mesh; sacks, 4.50; bulk 3.00
Marion, Va.—Analysis, 90% $CaCO_3$—50% thru 100 mesh 2.50
Memphis, Jct., Ky—Analysis, 95.31% $CaCO_3$, 1.12% $MgCO_3$; average price. ¼ in. down 2.00
Mascot, Tenn.—Analysis 52% $CaCO_3$, 38% $MgCO_3$.
80% thru 100 mesh 3.00
All thru 10 mesh 2.50
80% thru 200 mesh 5.00
Paper bags, $1.50 extra per ton; burlap, $2.00 extra per ton.
Maxwell, Va. 2.50
Mountville, Va. — Analysis, 76.6% $CaCO_3$, 22.83% $MgCO_3$—100% thru 20 mesh; 100 lb. ppr., 7.00; bulk 5.50
Ocala, Fla. — Analysis, 98% $CaCO_3$—75% thru 200 mesh 4.50
Tyrone, Ky.—Analysis, 90% $CaCO_3$ 4% $MgCO_3$—90% thru 4 mesh ..... 1.75@2.25
WESTERN:
Cement, Calif.—Analysis, 95% $CaCO_3$, 2% $MgCO_3$—50% thru 50 mesh 5.00
Colton, Calif.—Analysis, 95% $CaCO_3$, 1½% $MgCO_3$—all to pass 14 mesh; bags 5.00; bulk 3.50
Sacks, 15c extra, returnable.
Kansas City, Mo., Corrigan Sid'g—50% thru 50 mesh; bulk 2.00
Oro Grande, Calif.—Analysis, 94% $CaCO_3$, 2% $MgCO_3$—85% thru 200 mesh; bags, 10.25; bulk 4.00
Terminus, Calif. — Analysis, 96.2% $CaCO_3$, .04% $MgCO_3$—60% thru 200 mesh, 90% thru 100 mesh, 95% thru 50 mesh, 100% thru 4 mesh; sacks, 6.00; bulk 5.25
Tulsa, Okla.—90% thru 4 mesh ..... .50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:

Beach City, O.—Washed and screened 3.00
Berkeley Springs, W. Va. 2.50
Bridgeton, N. J.—Washed, 2.50; dried 3.00
Cedarville and South Vineland, N. J. ..... 2.25@2.75
Cheshire, Mass. ..... 5.00@7.00
Columbus, Ohio ..... 2.50@3.00
Gray Summit, Mo. ..... 2.50@4.00
Hancock, Md.—Damp 2.00
Klondike and Pacific, Mo. ..... 2.50@3.00
Leesburg, Pa. — Core, and molding coarse 3.00
Mapleton, Pa.—Dry 4.00
Glass, damp 3.00
Massillon, Ohio 3.50
Millington, Ill. ..... 2.25@3.00
Mineral Ridge, Ohio 3.60
Montoursville, Pa.—Green, washed ..... 2.00@2.75
Morgantown, W. Va. ..... 3.00@3.25
Oregon, Ill.—Large contracts ..... 2.00@2.75
Ottawa, Ill. ..... 2.00@2.25
Pittsburgh, Pa.—Dry, 4.00; damp 3.00
Robinson, Md.—Washed, damp 2.00
Rockwood, Mich. 3.50
St. Marys, Pa.—Green 2.50
Sands, Elk Co., Pa.—Selected, green 2.75
Thavers, Pa.—Washed 2.50
Tygarty, Ky.—Washed, not dried 2.60
Utica, Ill. ..... 1.75@2.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Ambridge, South Heights, Pa.		**1.30**		**1.30**	**1.00**	**1.00**
Attica, N. Y.	**.75**	**.75**	**.75**	**1.00**	**1.00**	**1.00**
Erie, Pa.		1.00	1.15		1.25	
Farmingdale, N. J.	.48	.48			1.40	
Hartford, Conn.	**.90**		1.25	1.15	1.15	1.15
Leeds Junction, Me.		.60@ .75	2.00	1.75	1.65	1.50
Ludlow, Mass.	**.75•**	**.75•**	**1.70**		**1.50•**	**1.50•**
Pittsburgh, Pa.		**1.30@1.50**			**1.00**	**1.00**
Portland, Maine		.50@ .60		1.50		1.35
Texas, Md.		1.00		Pure white sand, 1.50		
Washington, D. C.	**.75**	**.75**	**2.00**	**1.40**	**1.20**	**1.20**
CENTRAL:						
Alton, Ill.		.85				
Anson, Wis.	.50@ .60	.50@ .60		1.00		.90@1.00
Attica and Covington, Ind.	.90	.90	.90	1.00	1.00	1.00
Barton, Wis.		.70		.80	.80	.80
Beloit, Wis.		.65	.65		.65	
Chicago, Ill.		1.75@2.23	1.75@2.43			
Cincinnati, O., and vicinity	1.20	1.15		1.15	1.15	
Columbus, O.	.90	.90@1.25	.90@1.25	.90@1.25	.90@1.25	.90@1.25
Des, Moines, Ia.	1.00	.75	1.60	1.60	1.60	1.60
		25% gravel, 1.00; 50% gravel, 1.20				
Detroit, Mich.	.65	.65	.95	.95	.95	.95
Earlestead (Flint), Mich.	.70	60-40 sieves, .85; Pebbles, .95				
Eau Claire Wis.	.40@ .50	.60		1.25	1.10	
Elgin, Ill.		.80	1.00	.80	.80	.80
Elkhart Lake, Wis.	.65	.57	1.00	.77	.77	
Grand Rapids, Mich.		.60		.90	.85	
Greenville, Mechanicsburg, O.	.80	.70	.80	1.00	.85	.80
Humboldt, Ia.		1.35	2.20	2.20	2.20	2.20
Indianapolis, Ind.	**.60**	**.60**		**1.50**	**.75**	**.75**
Janesville, Wis.		.65@ .75			.75@ .85	
Le Mars, and Doon, Ia.		.90		1.80		
Lincoln, Neb.	Sand .80, sand and gravel 1.30, drained for shipment					
Mason City, Ia.	.90	.80	1.90	1.80	1.70	1.65
Milwaukee, Wis.	1.40	1.40	1.40	1.40	1.40	1.40
Minneapolis, Minn.	.50	.50	2.00	2.00	1.75	1.50
Moline, Ill.	1.40	1.60	1.90	1.90	1.90	1.90
Oxford, Mich.		.50		1.10	1.00	1.10
Riton, Wis.		.85				.85@1.00
St. Louis, Mo., f. o. b. cars	1.65	1.70	1.85	1.65	1.60	1.60
Summit Grove, Clinton, Ind.	.90	.90	.90	1.00	1.00	1.00
Terre Haute, Ind.	1.00@1.25	1.00	1.25	1.25	.90@1.25	.90@1.25
Toledo, Ohio	**.75**	**.75**				
Winona, Minn.	.80	.70	2.00	1.75	1.50	1.50
Yorkville, Moronts, Oregon and Sheridan, Ill.	**.90**	**.90**	**.90**	**.90**	**.90**	**.85**
SOUTHERN:						
Alexandria, La.	.60@ .90					1.65@1.85
Charleston, W. Va.		Sand 1.40@1.50—Gravel 1.50				
Dougherty, Okla.	.85	.75	1.25	1.40		1.25
Flomaton, Ala.		1.00		2.25		
Ft. Worth, Tex.	2.00@2.25•	2.00@2.25•	2.75@3.00•	2.75@3.00•	2.75@3.00•	
Greenville, Miss.		1.10				1.00
Jedburg, Mo.		1.05	1.20	1.00	1.00	.95
Knoxville, Tenn.	1.00@1.15	1.00@1.15	1.60	1.60	1.60	1.40
Lake Weir, Fla.		**.75**				
Macon, Ga.		.75@1.00				
Memphis, Tenn.	**1.40**	**1.40**	**1.50**			**1.50**
N. Martinsville, W. Va.		1.30				1.00
New Orleans, La.	**1.00**		**1.75**		**1.25**	
Pine Bluff, Ark.	1.25	.92	Washed gravel, all sizes, 2.30			
Roseland, La.				1.25		
Tulsa, Okla.		.70				
Waco, Texas	.70@ .80	.70@ .80				
WESTERN:						
Denver, Colo.	.50•					
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.	(Kaw River sand, car lots, .75 per ton, Missouri River, .85)					
Niles, Calif.	1.00	1.00	.90@1.10	.85@1.00	.85@1.00	.85@1.00
Porteau, B. C.	1.30	1.30	1.30			1.20
Pueblo, Colo.	1.20•	1.00•			1.50•	
Roseburg, Ore.	2.00	1.75	2.00	1.75	1.75	1.75
San Diego, Calif.	.80@1.00	.80@1.00	1.30@1.60	1.25@1.55	1.15@1.45	1.10@1.40
San Francisco, Calif.		1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Seattle, Wash.	1.50•	1.50•	2.00•	1.50•		1.50•

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
Albany, Ga.	.70@1.00					
Attica, Covington, Silverwood, Ind., and Palestine, Ill.	.75	.75	.75	.75	.75	.75
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Cape Girardeau, Mo.			River sand, 1.00 per yd.			
Cherokee, Hawarden, Ia.			.80 per ton—1.20 washed			
Detroit, Mich.	1.10•					
Dudley, Ky. (Crushed Sand)		1.15		1.10		
Elkhart Lake, Wis.	.70	.58	.90	.72	.72	
Fishers, N. Y.	75@ .85					.75@ .85
Ft. Jefferson, Mechanicsb'g, O.	**.70**	**.60**	**.60**			
Glenville, N. Y.				1.00•		
Hartford, Conn.		1.00•				
Janesville, Wis.		.65			.75	
Lindsay, Tex.	.85				.60	
Oxford, Mich.					.75	
Roseland, La.		.75				
Saginaw, Mich., f. o. b. cars		.75	1.30	1.30	1.30	1.30
Summit Grove, Ind.	.65	.65	.65	.65	.65	.65
Valde Rouge, La.						.85
Waco, Texas		.80		1.50		1.30
Yardville, N. J.		**.50@ .75**				
York, Pa.		1.00@1.30		(crushed rock sand)		

•Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag

City or shipping point	Roofing	¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Bethlehem and Emaus, Pa.	**2.50**	**.90**	**1.50**	**1.20**	**1.20**	**1.20**	**1.20**
Buffalo, N. Y.	2.35	1.25	1.25	1.25	1.25	1.25	1.25
E. Canaan, Conn.	4.00	1.00	2.50	1.35	1.25	1.25	
Eastern Pennsylvania and Northern New Jersey	**2.50**	**.90**	**1.50**	**1.10@1.25**	**1.10@1.25**	**1.10@1.25**	**1.10@1.25**
Erie, Pa.	2.35	1.25	1.25	1.25	1.25	1.25	1.25
Emporium, Pa.	2.35	1.25	1.25	1.25	1.25	1.25	1.25
Hokendaugua and Donaghmore, Pa.	**2.50**	**.90**	**1.50**	**1.20**	**1.20**	**1.20**	**1.20**
Lebanon, Pa.	**2.50**	**.85**	**1.50**	**.85**	**.85**	**.85**	**.85**
Sharpsville and West Middlesex, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Pennsylvania	**2.50**	**1.25**	**1.25**	**1.25**	**1.25**	**1.25**	**1.25**
CENTRAL:							
Chicago, Ill.			All sizes, $1.50, F. O. B. Chicago				
Detroit, Mich.			All sizes, 1.65, F. O. B. Detroit				
Ironton, Jackson, O.	2.00	1.35	1.70	1.35	1.35	1.35	1.35
Toledo, O.	2.20	1.70	1.95	1.95	1.95	1.70	1.70
Youngstown, Dover, Hubbard, Leetonia, Struthers, Steubenville, Lowellville & Canton, O.	2.00	1.70	1.70	1.30	1.30	1.30	1.30
SOUTHERN:							
Alabama City, Ala.	2.05	1.00	1.25	1.25	1.25	1.00	.95
Ensley, Ala.	2.05	1.00	1.25	1.25	1.25	1.00	.95
Longdale, Goshen, Glen Wilton and Low Moor, Va.	**2.50**	**1.00**		**1.25**	**1.25**	**1.15**	**1.05**

Agricultural Lime and Hydrate

	—Agricultural Lime— Bulk	Bags	Per Cent CaO	Per Cent MgO	Agricultural Hydrate Bags
EASTERN:					
Adams, Mass.		8.00	58.5	0.5	
Bellefonte, Pa.	9.00		98.2	.72	
Berkeley, R. I.			**50**	**18**	**15.00**
Branchton, Pa.		**5.50**			
Cassadaga, N. Y.—Marlime	8.00	10.00	48.07	1.08	
Cavetown, Md.	**8.50**				
Cedar Hollow, Devault, Rambo and Swedeland, Pa.	10.50		45.50	30.50	13.00
Chippewa, Pa.	6.00		78.67	1.33	
Farnams, Mass.	5.00	6.50	60	2	
Frederick, Md.	**7.75**		**88**	**5 to 8**	**10.50**
Grove, Md.	**8.00**				**10.75**
Highgate Springs, Vt.	**6.00**		**85**	**2**	**8.00**
Hot Springs, N. C.	3.25	4.75			
Hyndman, Pa.	5.00	8.50	80.23	2.87	
Lime Ridge, Pa.	6.00@7.50		80.56-62.71	3.87-1.96	
Mt. Union, Pa.	**6.25**		93.69		
Newburgh, N. Y.			57	38	8.00
Paxtang and Lemoyne, Pa.	5.50		63	3	
Rockland, Maine		8.00	65	1	
Rosendale, N. Y.	**8.00**	**9.00**	**92**	**5**	
Texas, Md.		9.00			
Union Bridge, Md.	11.00	5.50	73	1	13.00
Williamsport, Pa.	6.00	10.00	75	3	10.00
West Rutland, Vt.	4.50	7.50	68	3	
West Stockbridge, Mass.					15.00
Williams and Blue Bell, Pa.		8.25	57	33	11.25
York, Pa.	8.50	11.75	97	2	11.75
CENTRAL:					
Alton and Hannibal, Ill.	**11.50**		**.95**		
Delaware, O.			50.0	5-12	10.00
East Sparta, O.			42	62	10.00
Knowles and Valders, Wis.	5.00	9.00	55	45	12.50
Manistique, Mich.	**11.00**		**95**	**2**	**11.00**
Marblehead, O.			85.10	12.92	12.00
Mitchell, Ind.					12.50
Sheboygan, Wis.	**5.50**	**8.50**	**58**	**40.5**	
Woodville, Ohio			47.50	31.60	11.50
SOUTHERN:					
Burns, Tenn.	9.50		96	0.54	12.00
Chippewa, Fla.	5.00		80.0	15.0	
Claremont, Va. (Marl.)	5.00	7.00	85-95	2-5	
Dittlinger, Texas		**9.00@11.00**	**98.62**	**0.29**	**12.50@15.00**
Erin, Tenn.	9.50		97.82	0.12	
Karo, Va.	9.00		97	1.25	
Knoxville, Tenn.	10.00		98.4	1	13.00
Lushing, Va.	**9.00**	**11.25**	**60**	**15**	**12.75**
Maxwell, Va.	**6.50**		**84**		**6.50**
Newala, Ala.	**10.00**		**99.33**		
Staunton, Va.	8.00	10.50	85	10	
WESTERN:					
Colton, Calif.			**97**	**2**	**15.00**
Kirtland, N. Mex.	12.50				
San Francisco, Calif.		15.00	97	0.33	15.00
Tehachapi, Cal.	12.00@15.00	14.00@17.00	98	1.00	
Orofino, Idaho		6.50	**95**	**2.16**	

Miscellaneous Sands

(Continued from preceding page)

FOUNDRY SAND:	
Ableman, Wis. — Brass molding and molding fine	**3.00**
Albany, N. Y.—Glass and sand blast	5.00@7.00
Core	1.65@2.50
Furnace lining	2.00@3.00
Molding fine, coarse and brass	2.50@3.50
Allentown, Pa.—Core	1.50@1.75
Molding coarse	1.50@1.75
Arenzville, Ill.—Molding fine	1.70@1.90
Beach City, O. — Core, washed and screened	2.00@2.50
Furnace lining	**2.50@3.00**
Molding fine and coarse	**2.25@2.50**
Bowmantown, Pa.—Core	**1.35@1.50**
Molding, coarse	1.80@2.00
Bridgeton, N. J.—Core	2.00
Cleveland, O.—Molding coarse	1.50@2.00
Brass molding	1.50@2.00
Molding fine	1.50@2.00
Core	1.25@1.50
Columbus, O.—Core	.60@2.50
Brass molding	2.50
Sand blast	5.00@5.50
Glass sand	3.00
Molding, fine and coarse	2.00@2.25
Conneaut, O.—Molding fine	2.25@2.50
Molding coarse	2.00@2.25
Delaware, N. J.—Molding fine	2.00
Molding coarse	1.90
Brass Molding	2.15
Dresden, O.—Core	1.50
Molding fine and coarse	1.50@1.75
Brass molding	2.50

Miscellaneous Sands

(Continued)

Dundee and Chalfants, O.—Core	3.25
Glass, sand blast and traction	3.00
Molding fine, brass molding	3.75
Molding coarse	3.25
Furnace lining	2.75
Eau Claire, Wis.—Core	1.00
Roofing gravel	1.00@1.25
Sand blast	3.00@4.25
Traction sand	.50
Falls Creek, Pa.—Glass sand, washed	2.50
Core sand, washed or unwashed	2.00
Furnace lining, unwashed	2.00
Molding fine, washed	2.50
Molding coarse, washed or unwashed	2.00
Sand blast, washed	3.50
Stone sawing, washed	2.50
Traction, washed	2.00
Fleetwood, Pa.—Furnace lining	2.25
Franklin, Pa.—Traction	3.00
Brass molding	3.50
Core	2.00@3.00
Molding fine	3.50
Molding coarse	**3.00**
Sand blast	5.00
Greenville, Ill.—Molding coarse	1.80@2.00
Hancock, Md.—Core and brass mldg.	1.65
Hellam, Pa.—Core	2.00@2.50
Joplin, Mo.—Stone sawing, flint	1.00@1.25
Kansas City, Mo.—Missouri River core	.80
Klondike and Gray Summit, Mo.—Molding fine	2.00@2.50
Molding coarse	2.50@3.00
Mapleton, Pa.—Core, furnace lining, molding fine and coarse damp	2.50
Core, furnace lining, moulding, fine and coarse, dry	3.50
Massillon, O.—Glass sand, molding fine and coarse, core, traction and furnace lining	3.00
Michigan City, Ind.—Core, glass, traction and brass molding	.60
Millington, Ill. — Glass, core, furnace lining, roofing and stone sawing	2.00
Mineral Ridge, O. — Core, molding, sand blast, roofing, etc., washed, screened (damp)	3.00
Montoursville, Pa.—Core and traction	1.50@2.00
Brass molding	1.75@2.25
Glass sand	2.00@2.75
New Lexington, O.—Molding fine	3.50
Molding coarse	**3.25**
Oregon, Ill.—Core sand	2.25@3.00
Furnace lining	2.00@2.75
Molding fine, coarse and brass	1.00@1.65
Plasters' molding	2.50
Sand blast	2.25@4.00
Placing sand	3.50
Ottawa, Ill.—Crude silica sand	1.25@1.50
Core, molding, fine and coarse	1.10@2.25
Furnace lining	1.25@2.25
Roofing	2.00@5.00
Sand blast	4.00@5.00
Ridgeway, Pa.—Glass sand, green	2.25
Glass sand, wash	2.50
Molding, fine and coarse	1.20
Rockwood, Mich.—Core	3.00@3.50
Roofing, stone sawing	3.50
Sand blast	4.00
Round Top, Md. — Glass sand, core and roofing sand; washed, damp	2.50
St. Peter, Minn.—Glass sand	2.25
Core sand	**2.25**
Brass molding	**2.25**
Molding fine	**2.25**
Thayer, Pa.—Traction	2.00
Furnace lining	1.10
Molding fine and coarse	1.00@1.25
Core, green	2.00@2.25
Tulsa, Okla.—Sand blast	6.50
Tygarty, Ky.—Core and stone sawing	2.60
Fire-brick sand, washed but not dried	2.15@2.40
Utica, Ill.—Core and furnace lining	1.25
Molding, fine and coarse	1.00
Stone sawing	1.50
Warwick, Ohio—Core, furnace lining, molding fine and coarse (dry)	**2.75**
Same, green	**2.50**
Wedron, Ill.—Core (crude silica)	1.10@1.25
Molding fine	1.10@1.25
Furnace lining	1.25
West Albany, N. Y.—Molding fine	2.25
Molding coarse	2.25
Winnipeg, Man., Can.—Roofing sand	4.00
Zanesville, Ohio—Molding fine and brass	2.50
Molding coarse	2.25
Pulverized silica thru 140 mesh	8.50
Thru 200 mesh	9.50

Crushed Gypsum

Blue Rapids, Kan.	3.50
Castalia, O.	3.00
Ft. Dodge, Ia.	3.50
Grand Rapids, Mich.	3.50@4.50
Gypsumville, Man., Can.	3.50
Oakfield, N. Y.	**4.00**
Gypsum, O.	3.50
Port Clinton, O.	3.50
Saltville, Va.	**4.50**
Winnipeg, Man., Can.	5.00

(Gypsum) Land Plaster

Castalia, O.	6.00
Bags extra—Jute 3.00; ppr., 1.00.	
Garhutt, N. Y.—Bags extra	7.50
Grand Rapids, Mich.	8.50
Mound House, Nev.	7.00@8.00
Sacks 25 extra.	
Oakfield, N. Y.	7.50
Sandusky, O.	6.00
Jute 3.00 extra; ppr., 1.00 extra.	
Los Angeles, Calif.	12.50

Rock Phosphate

Raw Rock

Per 2240-lb. Ton

Centerville, Tenn—B.P.L. 72% to 75%	6.00@8.50
B.P.L. 65%	8.00
B.P.L. 70%	9.00@10.00
Gordonsburg, Tenn.—B.P.L. 68%	6.50@7.00
B.P.L. 70%	7.50@8.00
B.P.L. 72%	8.50@9.00
Paris, Idaho.—2,000 lb. mine run, B.P.L. 70%	4.50
Wales, Tenn.—B.P.L. 70%	8.00

Ground Rock

Per 2000-lb. Ton

Centerville, Tenn.—B.P.L. 70%—	
90% thru 100 mesh	9.00@10.00
B.P.L 75% (brown rock)	12.00
Mt Pleasant, Tenn—B.P.L. 68%—	
13% Phosphorus	7.50@9.00
14% Phosphorus	8.00
B.P.L. 65@70%	6.50@8.50
Norwills, Fla.—(Fla. Hard Rock)—	
B.P.L. 68%	10.00

Florida Soft Phosphate

Raw Land Pebble

Per Ton

Bartow and Norwills, Fla.—BP.L. 60%; bulk	10.00
Jacksonville (Fla.) District	10.00@12.00

Ground Land Pebble

Per Ton

Croon, Fla.—Ground, 30%	16.00
Pulverized soft, 26%	17.50
Jacksonville (Fla.) District	14.00
Add 2.50 for sacks.	
Phoslime, Fla.—In burlap bags	15.00
Morristown, Fla.—24% phosphoric acid	17.50@20.00
Lakeland, Fla.—N.B.P.L.	13.50

Portland Cement

Current warehouse prices, carload lots at principal cities, without bags:

New York (del.)	$3.10
Jersey City (del.)	2.89
Boston	2.87
Chicago	2.17
Pittsburgh	2.17
Cleveland	2.43
Detroit	2.51
Indianapolis	2.31
Toledo	2.51
Milwaukee	2.39
Duluth	2.10
Peoria	2.43
Cedar Rapids	2.51
Davenport	2.47
St. Louis	3.40
San Francisco	3.09
New Orleans	3.60
Minneapolis (del.)	2.70
Denver	3.10
Kansas City	2.76
Lincoln, Neb.	3.05
Seattle	3.10
Dallas	2.85
Atlanta	3.00
Cincinnati	**3.32**
Los Angeles	3.21
Baltimore (del.)	2.93
Montreal (including bags)	3.50

NOTE—Bag charge is generally 25c each.

Concrete Brick

Prices given per 1,000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Bellow Falls, Vt.	25.00	35.00
Bridgeport, Conn.	31.00	32.00
Buffalo, Niagara Falls and Rochester, N. Y.	21.00	
Eau Claire, Wis.	20.00	30.00@45.00
Houston, Tex.	22.00	27.00
Lockport, N. Y.	17.00	
Milwaukee, Wis.	18.00	40.00@65.00
Omaha, Neb.	32.00	42.00
Piqua, O.	20.00	25.00@30.00
Portland, Ore.	28.00	48.00@75.00
Fancy brick	100.00@150.00	
St. Paul, Minn.	18.00	30.00@35.00
Springfield, Ill.	18.00@20.00	20.00@25.00

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f.o.b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$ 9.30	$8.40	$8.10	$8.10
24x14	9.30	8.40	8.10	8.10
22x12	10.72	8.70	8.77	9.10
22x11	10.72	8.70	8.77	9.10
20x12	10.72	8.70	8.77	9.10
20x10	11.70	9.60	9.42	9.42
18x10	11.70	9.60	9.42	9.42
18x 9	11.70	9.60	9.42	9.42
16x10	11.70	9.60	9.42	9.42
16x 9	11.70	9.60	9.42	9.42
16x 8	11.70	9.60	9.42	9.42
18x12	11.05	9.30	9.10	9.10
16x12	11.05	9.30	9.10	9.10
14x10	11.05	9.30	8.77	8.77
14x 8	11.05	9.30	8.77	8.77
14x7 to 12x6	10.40	9.00	8.45	.....
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$7.50	$7.50	$5.75
22x11	9.10	7.75	7.75	5.75
Other sizes	9.10	8.10	8.45	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

The following are the prices per square for slate, f.o.b. cars quarries, Granville, N. Y., the prices given in each case being for No. 1 Sea Green Roofing Slate:

22x11, 20x12, 20x11, 20x10, 18x12, 18x10, 18x9, 16x12, 16x10	10.20
24x12, 22x12, 16x9, 16x8, 14x12, 14x10	9.90
26x14, 24x14, 22x14, 20x14	9.60
14x9, 14x8, 12x10	9.00
14x7, 12x9, 12x8	8.70
12x7, 11x8, 11x7, 10x8	7.50
12x6, 10x7	7.20

Granulated slate per net ton, f. o. b. quarries, Vermont and New York, 7.50.

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton Finished	Common
New York	$21.00	$20.00
Kansas City	27.20	26.20
Chicago	20.00	.....
St. Louis	26.00	20.00
Boston	29.00	26.00
Dallas	.....	25.00
Cincinnati	19.50	17.60
San Francisco	25.40	22.00
Minneapolis	27.00 (white)	22.00
Denver (bbl.)	.....	3.20
Detroit	**22.00**	**19.00**
Seattle	27.00	.....
Los Angeles	30.00	30.00
Baltimore	24.00 (East)	.....
Montreal	28.00	.....
Atlanta	.....	18.00
New Orleans	.....	22.50

	Lump per 200-lb. Finished	Barrel Common
New York	$ 3.50 at plant	$ 3.30*
Kansas City	2.50	2.40
Chicago	.....	1.75
St. Louis	.....	4.12½*
Boston	3.80	3.55
Dallas	.....	2.50†
Cincinnati	.....	2.10
San Francisco	.....	2.25
Minneapolis	2.00	1.70
Denver	1.00 (bu.)	.....
Detroit	2.00†	1.80†
Seattle	3.25†	.....
Los Angeles	3.00*	3.00*
Baltimore	.....	13.00‡
Montreal	15.00‡	.....
Atlanta	.....	1.80†
New Orleans	2.70	2.50

*300-lb. barrels. †Per 180-lb. barrel. ‡Per ton.
NOTE—Refund of 10c per barrel with 25c per ton off on hydrated.

Talc

Prices given are per ton f. o. b. (in carload lots only) producing plant, or nearest shipping point.

Baltimore, Md.—Crude talc	4.00
Cubes	50.00
Blanks, per lb.	.07
Biltmore, N. C.—Ground talc (150-200 mesh), 200-lb. bags	15.00@30.00
Pencils and steel workers' crayons, per gross, 1.25@1.45 and	1.55@ 1.60
School crayons, per gross	1.15@ 1.20
Roller mill crayons, per gross	1.75@ 1.90
Chatsworth, Ga.—Crude talc	8.00@10.00
Ground talc (150-200 mesh), bags	12.50
Pencils and steel workers' crayons, per gross	1.50@ 2.00
Chester, Vt.—Ground talc (150-200 mesh), bulk, 10.50@12.00; bags	12.00@14.00
Glendale, Calif.—Ground talc (150-200 mesh)	16.00@30.00
(Bags extra)	
Gouverneur, N. Y.—Crude talc	4.00
Ground talc (150-300 mesh)	17.00@24.00
Henry, Va.—Crude talc (lump mine run), per 2000-lb. ton	3.00@ 3.25
Ground talc (20-50 mesh), bags	8.50@ 9.00
Ground talc (150-200 mesh), bags	11.00@13.50
Johnson, Vt.—Ground talc (20-50 mesh), bulk	8.50
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@20.00
(Bags extra)	
Keeler, Calif.—Ground talc (150-200 mesh), bags	15.00@30.00
(Bags extra)	
Los Angeles, Calif.—Ground talc (20-50 mesh) 200-lb. bags	12.00
Ground talc (150-200 mesh) 200-lb. bags	20.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	12.00@18.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@10.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@22.00
(Bags extra)	
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	8.50
(Bags extra)	
Ground talc (150-200 mesh), bulk, 10@15.00 and	10.00@15.00
(Bags extra)	
Pencils and steel workers' crayons, per gross	1.20@ 2.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	13.00@14.00
Barton, Wis.	14.00
Bloomfield, Ont., Can.	**18.00**
Boise, Idaho (in yard)	18.00
Boston, Mass.	18.00@19.00
Brighton, N. Y.	19.00
Buffalo, N. Y.	**16.50**
El Paso, Texas	15.00
Gary, Ind.	11.50@12.00
Grand Rapids, Mich.	15.00
Lancaster, N. Y.	16.50
Michigan City, Ind.	13.00
Milwaukee, Wis. (delivered at job)	17.50
Plant City, Fla.	**17.00**
Portage, Wis.—Common	20.00@25.00
Face	35.00
Rochester, Mich.	**13.00**
Saginaw, Mich.	17.00
San Antonio, Texas—Common	20.00
Face	27.50
South Dayton, Ohio	16.50
Syracuse, N. Y. (delivered at job)	25.00
F. o. b. cars, plant	21.00
Toronto, Can.	17.00
Washington, D. C.	14.50
Winnipeg, Can. (less $1 trade disc.)	19.00

Natural Cement

Current price for 500 bbl. or over, f.o.b., exclusive of bags:

	Current
Minneapolis (Rosendale)	$2.80
Kansas City (Ft. Scott)	1.60
New Orleans	3.36
Atlanta (Magnolia)—ton	11.00
Cincinnati (Louisville)	2.75
Boston (Rosendale)	2.35

News of the Industry

Incorporations

The Pineville Stone & Quarry Co., Pineville, Ky., has been incorporated by T. J. Asher, J. H. Bailey and M. Bradenberg.

The Texas Stone Products Co., Dallas, Texas, has been incorporated for $22,000 by J. N. Fry, Fred Webb and F. P. Warren.

The Summit Marle Co., Watertown, Wis., has been incorporated for $6,000 by E. F. Genrich, H. R. Moldenhauer and Ed Weber.

Wm. Wolf Sand & Gravel Co., West Allis, Wis., has been incorporated for $5,000 by Wm. Wolf, Hugo Schultz and J. H. Schlintz.

The Maspeth Sand and Gravel Co., Queens, N. Y., has been incorporated for $20,000 by D. D. Deutsch, G. Adelman, and V. Fernandez.

The Maryland Lime Marl Co., Hagerstown, Md., has been incorporated for $75,000 by Frank D. Adams, Harry E. Bester and Thos. L. Smith.

The Estill Springs Sand and Gravel Co., Louisville, Ky., has been incorporated for $10,000 by Ella P. Kaiser, Adelaide Kaiser and Jacob H. Black.

The Hamilton Gravel Co., Hamilton, Ohio, has been incorporated for $50,000 by C. J. Parish, E. J. Frechtling, H. R. Reigart, W. P. Watson and R. S. Radcliffe.

The Berkshire Construction Co., Pittsfisld, Mass., has been incorporated for $50,000 by G. F. Home, president; J. H. McAllister, treasurer, and A. F. Viale.

The National Concrete Construction Co., Victoria, Va., has been incorporated for $50,000 by A. M. Whelpley, Wilmington, N. C., and others. Mr. Whelpley is president.

The Prestone Products Corporation, West Allis, Wis., has been incorporated for $15,000 by A. E. Krohne and F. C. Krohne to manufacture and sell building material.

Holton, Richards and Co., Inc., Boston, Mass., has been incorporated by W. B. Holton, Jr., president; Atherton Richards, treasurer, and E. C. Rust. The firm does industrial engineering work.

The Fay Sand & Gravel Co., Chisholm, Minn., has been incorporated for $25,000 to produce sand and gravel. Incorporators are Wm. E. Fay, of Chisholm, and Ernest F. Bailey, of Kelley Lake, Minn.

The John J. Gallagher Co., Inc., Quincy, Mass., has been incorporated by John J. Gallagher, president; Henry T. Gallagher, treasurer, and Jas. E. O. Connell. The company deals in building, mill and mining materials.

The Appleton Cement Products Co., Appleton, Minn., has been incorporated for $50,000, to manufacture concrete silos, building products, etc. Incorporators are Otto R. Ames and Gerhard J. Benson, both of Appleton.

The United States Building Material Co., Chicago, Il., incorporated for $2,000,000, will use $241,400 of this in Wisconsin. E. B. West, 543 M. & M. Bank Bldg., Milwaukee, Wis., is their agent. The company deals in all building materials.

The Anderson Granite Co., Morton, Minn., has been incorporated for $100,000, to quarry and manufacture granite monuments and building material. J. W. Anderson, of Morton, Minn., and Eric Anderson, of Minneapolis, Minn., are incorporators.

The Portage Pass Development Co., St. Paul, Minn., has been incorporated for $50,000 by J. B. Benson, president; Daniel Norder, vice-president; C. F. Bruess, treasurer, and D. M. Benson, secretary; all of St. Paul. The company will quarry stone, sand and gravel.

The National Crushed Stone Co., Minneapolis, Minn., has been incorporated for $200,000 by H. P. Webb, president; A. S. Larson, vice-president, and W. M. Pratt, secretary-treasurer; all of Sandstone, Minn. The company will quarry and deal in crushed stone.

The Ottawa Sand and Clay Co., St. Peter, Minn., has been incorporated for $50,000 by J. N. Hayes, Jr., president; Edward Borneman, vice-president; R. B. Miller, secretary, and C. T. Weibezahn, treasurer. The company deals in sand, gravel and clay and manufactures the same into finished products.

Blaske Carter and Day Sand, Gravel and Building Material Co., St. Charles, Mo., has been incorporated for $50,000.

The Kennebec Pulpwood Co., Augusta, Me., has been incorporated for $100,000 by Blaine S. Viles, president, and W. R. Pattangall, treasurer and clerk.

The Northwestern Pipe Co., Rapid City, S. Dak., has been incorporated for $50,000 by J. D. Merritt, S. W. Lind, and G. C. Keown; all of Rapid City. The company manufactures concrete products.

The Canton Block and Tile Co., Canton, S. Dak., has been incorporated for $50,000 by J. R. Rowe, E. D. Rowe, and Elling Strand; all of Canton. The company deals in building materials of all kinds and manufactures concrete products.

Quarries

The Acme Cut Stone Co., Detroit, Mich., has increased its capital stock from $15,000 to $150,000.

The Campbell Stone Co., Saginaw, Mich., has increased its capital stock from $50,000 to $100,000.

The Amalgamated Sugar Co. has reopened its quarry at Arco, Idaho. A new tramway has been constructed.

The Northern Pacific Railroad has reopened its Emigrant, Mont., quarry. The rock is being used for rip-rap.

The Mentzer-Romberger Co., Harrisburg, Pa., stone products, has filed notice of dissolution under state laws.

The Hinman, Boynton Granite Co., Syracuse, N. Y., has filed notice of reorganization with an active capital of $40,000.

The Buckeye Stone Co., Dallas, Tex., recently organized with a capital of $150,000, is arranging for the operation of local stone properties. The company is headed by C. L. Johnson and M. V. Cullen.

The Shea & Donnelly Co., Summer Street, Boston, Mass., is having plans prepared for the construction of a one-story mill on Roland Street, 90x160 feet, to be equipped for stone cutting, finishing and affiliated operations.

The Nelson Stone Co., Buffalo Station, Va., recently organized with a capital of $50,000, is planning for the operation of extensive stone quarries in this section. L. A. Bodine is president and B. N. Bodine, secretary.

C. A. Baldi, Philadelphia, Pa., has secured a decision in the local court covering an award of $42,150 for three acres of quarry lands at Vine and Daggett Streets, taken by the city. The trial was on an appeal from a lower award made by the city board.

Samuel W. Harbold, York, Pa., has been appointed temporary receiver for the Rock Products Co., York, with plant in West Manchester Township. The receivership is in $50,000 bond. It is understood that the operation of the plant and business will be continued.

The Indiana Quarries Co., Bedford, Ind., has just completed the placing of a hydraulic stripping plant at a cost of $75,000. It consists of two large centrifugal pumps and a complete water main, reaching from Salt Creek to Oolitic, Hoosier and Perry, and Matthews and Buskirk plants.

The Farmers' Marl Lime Co., Staunton, Va., recently organized with a capital of $150,000, is arranging for the development of about 40 acres of property, lately acquired. It is proposed to install a mining plant to effect a daily output of about 200 tons of material. C. J. Johne is president and W. J. Chapman, secretary and treasurer.

The Union Rock Co., 2644 Compton Avenue, Los Angeles, Cal., has opened up a new deposit of porphyry rock and proposes to develop production to a considerable extent. The company has been installing considerable new machinery at its properties, and has completed the rebuilding of its Brush Canyon rock-crushing plant. New conveyors and elevating equipment have been placed in service, as well as a reduction disc grinder for furnishing smaller sizes of crushed rock. Particular attention is being given to an output of two-inch crusher run material for local street work. The company is also operating extensively at its sand and gravel plant in the vicinity of Azusa.

The New Bedford and Dartmouth Granite Co., New Bedford, Mass., quarry has been purchased by Mr. Flavien Cote, of Dartmouth, Mass.

The Virginia Marble & Onyx Co., Salt Petre, W. Va., of which Thos. Widdup is secretary and treasurer, will develop 207 acres, with daily output of 100 tons of crushed marble.

The Parklap Construction Co. are the contractors on the new power dam to be built across the Hudson River at Glens Falls, N. Y. The work requires the installation of a complete screening and crushing plant for crushed stone. The Kennedy-Van Saun Engineering and Manufacturing Co. have charge of the installation of the crushing plant, where they are installing two of their crushers, one a 42x36-in. steel frame balanced jaw crusher with hinged frame, the other a No. 6 Gearless Standard. They are also erecting a 60-in.x16-ft. revolving screen, belt conveyors, etc.

Sand and Gravel

A. R. Gilmore, Linden, Pa., is opening a new sand plant near Williamsport, Pa. He also has a plant in Linden.

The Second Broad River Sand Co., Jackson City, Tenn., will establish a plant in Bostic, N. C. Have installed steam hoister, tipple, etc.

The Carroll Development Co., Roanoke, Va., has been purchased by the General Minerals Co., Baltimore, Md. The company manufactured silica sand.

The Springfield-Pekin Sand & Gravel Co., Pekin, Ill., successor to the Virginia Timber Co., is stripping ground on the new addition to its sand and gravel pit.

The Western Silica Co., Los Angeles, Cal., has let contracts for the construction of a new mill for the grinding of silica and feldspar. The new mill will have a capacity of 35 tons per day.

The Wells Pit Sand Co., Proctor, W. Va., recently organized, is arranging for the operation of sand and gravel properties in this section. Percy M. and Otto M. Arrick Proctor head the company.

The Grand Rapids Sand and Gravel Co., Wisconsin Rapids, Wis., has changed its name to "Wisconsin Rapids Sand and Gravel Co." The name of the city has been recently changed from Grand Rapids to Wisconsin Rapids.

The Logansport-Greenville Gravel Co., Logansport, Ind., which was incorporated in Indiana recently for $500,000, announces that the Wilson Searight farm in Jefferson township, Cass county, has been leased by it for a long term agreement. According to its manager, Mr. Kistler, plans are being made for the construction of a plant on the newly-acquired site that will cost in the neighborhood of $250,000.

Sand and gravel companies in the Pittsburgh, Pa., section are busy at the present time, and the fine open season has gone materially to assist increased operations. The call for sand and gravel is fair, and a good supply is available at the Pittsburgh market. The Rodgers Sand Co. is operating its diggers in the Ambridge section, and many tows from this point are coming into the local port. The Keystone Sand & Supply Co. is maintaining active production at its properties in the vicinity of Corapolis.

Sand companies in the vicinity of Mt. Penn, near Reading Pa., are making ready for active production with the coming of the real Spring season. Machinery and operating equipment in sizeable quantities is finding its way to this section for immediate installation. There is a little controversy now prevailing here, as the city is seeking to acquire certain lands heretofore given over to sand and gravel production. An appropriation of $50,000 has been arranged by the city council, the fundamental idea being to preserve the site for the scenic beauty to the municipality.

Lime

The Kelly Island Lime & Transport Co., News-Leader Bldg., Cleveland, O., has plans under way for the erection of two new buildings at Sandusky, O., to cost about $75,000. The structures will adjoin the present work of the company on Water Street.

The Wheeling Wall Plaster Co., Wheeling, W. Va., has increased its capital stock of $250,000.

James Gamme will develop limestone deposits at Ponca City, Okla. He will install a mill and crusher.

The Washington Brick, Lime & Sewer Pipe Co., Spokane, Wash., will erect a terra cotta building to house its offices, at a cost of about $75,000.

The Peerless Agricultural Corporation, Columbia, Tenn., has preliminary plans under way for the erection of a new fertilizer manufacturing plant. A site has been selected.

William H. Fox, Graysville, Tenn., and associates are organizing a new company for the establishment of a new lime plant. A complete hydrating works will be installed. Operations will be inaugurated at an early date.

The Valley Marl and Lime Corporation is being organized by E. A. Schubert, consulting mining engineer of Roanoke, Va. The plant will start operations about Sept. 1, and will manufacture limestone and marl for agricultural purposes.

The Planters' Lime, Phosphate & Fertilizer Co., Batesville, Ark., a $1,500,000 concern, has lately been organized to develop certain stone resources in Independence and Izard Counties in the vicinity of Penters Bluff, on the White River Railroad. The principal products will be burned, ground limestone, hydrated lime and commercial fertilizer. The company owns 5,000 acres, containing approximately 19,602,000 tons of phosphate rock and 2,243,211,249 tons of high-grade limestone. The property also contains deposits of manganese and will be mined only when they come in contact with it in their quarries. Two big quarries will be opened as soon as the plants for handling phosphate and limestone can be constructed. Later a fertilizer plant will be constructed at Little Rock, where the finished product will be manufactured. The phosphate lies in stratified ledges from two to 15 feet thick and carries from 30 to 65 per cent bone phosphate. The limestone on the property is of two kinds: the St. Clair, which lays in ledges up to 210 feet thick, and the Izard, which is 235 feet thick in many places. The former is particularly adapted to the manufacture of lime, and the latter to the manufacture of ground limestone. The officers of the company are: J. R. Alexander of Scotts, Ark., president; C. G. Henry, Newport, Ark., vice-president; R. R. Ramey, Kensett, Ark., treasurer and general manager, and J. W. Williamson, Batesville, Ark., secretary.

Cement

The Peninsular Portland Cement Co. has moved its business office from Jackson to Cement City, Mich.

The Tidewater Portland Cement Co., Union Bridge, Md., has resumed operations after over a month's shutdown.

The Hudson Cement & Supply Co., Westwood and Whitmore avenues, Baltimore, Md., has filed notice of increase in capital to $500,000 for proposed expansion.

The Continental Portland Cement Co., St. Louis, Mo., have recently received 265,000 pounds of Fuller-Lehigh chilled cast iron shell lining plates. This includes two complete sets of Krupp ball mill liner plates, together with shell linings, partition and end plates for their 6x22-ft. tube mills.

Concrete Products

W. H. Merideth, De Queen, Ark., has installed concrete brick-making equipment and is furnishing this product to the trade.

The Rose Hill Brick & Tile Co. will establish a concrete tile plant in Rose Hill, N. C.; G. B. D. Parker, of Chinquapin, N. C., is president.

The Pierson Cement Block Co., 89 Dodd Street, East Orange, N. J., has filed notice of change of name to the "Pierson Concrete Products Co."

The McGeorge Gravel Co., Marshfield, Ore., plans the installation of a concrete tile factory. The plant is to have a capacity of 1500 tile per day.

The Winamac cement tile factory at Winamac, Ind., has been sold to Chris Harson and George and John Kenzuck. The new firm's name will be the Winamac Cement Products and Construction Company.

The Pennsylvania Reconstructed Stone Co., Williamsport, Pa., has started operations with several orders on their books. They manufacture a stone product comparatively new in that section of the country. Various stones, crushed to the fineness of sand and then combined with chemical binders are pressed into various shapes.

Manufacturers

The Mine and Smelter Supply Co., 42 Broadway, New York City, has issued Bulletin No. 64 on Wilfley Concentrating Tables. The bulletin describes these tables as to construction, design and use in ore mining.

The B. F. Sturtevant Co., Boston, Mass., has issued a new catalog on their Design 5 Turbo-Undergrate Blower, in which they describe in detail this blower. The catalog treats of the construction, care and operation and ordering of spare parts.

The Stephens-Adamson Mfg. Co., Aurora, Ill., has a new catalog entitled "S-A Belt Conveyors," which contains over 100 pages of valuable information relative to belt conveyor practice. Technical data is supplied in both tabular and graphical form.

The Good Roads Machinery Co., Philadelphia, Pa., has just issued a new catalog entitled "Everything for the Road-Maker." Road graders, drags, rock crushers, portable screening plants and road rollers are some of the equipment described and handled by this company.

The Hercules Powder Co., Wilmington, Del., has just issued a book entitled "Modern Road-Building and Maintenance." The book has been "prepared for the use of engineers, contractors, road officials, students, and all who are interested in the rational and economic solution of the many problems connected with our public roads and the traffic they are required to carry." Andrew P. Anderson, Highway Engineer of the Bureau of Public Roads, U. S. Dept. of Agriculture, is the author. The book consists of five parts: (1) Planning the road; (2) Road materials; (3) Road construction; (4) Road maintenance and repair; (5) The use of explosives; and, contains 146 pages. It should prove very interesting to anyone interested in good roads.

Retail Dealers

The Thorp Produce Co., Thorp, Wis., has increased its capital stock from $10,000 to $50,000. The company deals in building materials.

CLASSIFIED ADVERTISING

Rates for advertising in the Classified Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

Situations Wanted

Operator or executive of large quarry, lime or gravel plant. Qualified for general superintendent or general manager. 15 years' actual experience in construction, steam shovel work, drills, explosives and heavy machinery. Associate member American Society Civil Engineers; age 36; unmarried; salary or salary and bonus, minimum $5000 a year. References and interview. Address

Box 1469 **Care Rock Products**

WANTED

Position as quarry superintendent. Experienced in both Limestone and Trap Rock quarrying also mine stripping. Fifteen years' experience in handling drilling and blasting, steam and electric shovels, locomotives, crushing and screening, and power plants. Have also had experience on steel and concrete construction work. References furnished. Address

Box 1476 **Care of Rock Products**

Situations Wanted

Experienced Quarry Operator

Is desirous of getting in touch with financial parties with object of opening stone crushing plant in locality where large business is assured. Can guarantee success. Address

Box 1471 **Care of Rock Products**

POSITION WANTED

Superintendent desires engagement where thorough knowledge of steam shovel operation, transportation, heavy blasting and operation in detail are essential to production. Excellent reference. Address

Box 1472 **Care of Rock Products**

Situation Wanted

Manager of lime plant and large quarry operation desires to make a change. Thoroughly familiar with gas and coal fired kilns, hydration and up-to-date quarry methods. Efficient and energetic organizer. Technical graduate. Address

Box 1478 **Care of Rock Products**

Plants for Sale

Want to Sell or Join in Developing

a sand and gravel bed that I own on the R. R., with two large cities within 75 miles of the property, where I own a large deposit of good, clean, coarse sand and gravel, with plenty of water and a good gas well and 3 to 3½ foot seam of good clean coal right at the sand bed where I can furnish the cheapest power and fuel that can be gotten for manufacturing purposes. For further particulars address

E. M. A. Care of Rock Products

FOR SALE

Millions of tons of tailings or limestone gravel—a by-product of the zinc mines. Immediate delivery at rate of ten cars per day.

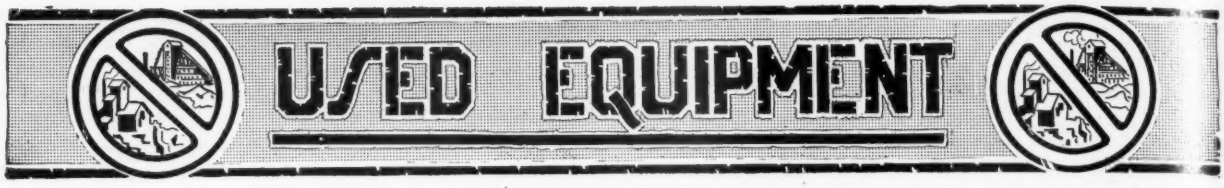
B. P. Larkin, Agent, Benton, Wis.

Help Wanted

Wanted—Sales Engineer

For our Crusher and Quarry Equipment Department and to work from Chicago office.

Austin Mfg. Company
910 S. Michigan Ave., Chicago



Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

Equipment for Sale

BOILERS

1—250-H.P. Sterling.
1—300-H.P. B. & W.
5—72-in.x18-ft. H. F. T. Boilers.

ENGINES

1—24x48-in. Corliss.
1—18x30-in. Side Crank Buckeye.
1—12x18-in. Side Crank H. S. G.
1—8x10½x14-in. Cross Compound H. S. G.
1—12-H.P. Fairbanks Morse Gasoline Engine.

WATER HEATERS

1—30-in.x8-ft. Pittsburgh.
1—33 in.x7 ft. 6-in. Hoppes.
1—30 in.x7 ft. 6-in. Harrison.

WATER PUMPS

1—14x7x10-in. Duplex—Laidlaw Dunn Gordon.
1—5x9x12½x10-in. Compound Duplex—Worthington.

FEEDWATER PUMPS

1—6x4x6 Manestee Duplex.
1—6x4x6 Dean Duplex.
1—7x4½x8 Pulling.

STACKS

1—48-in.x80-ft.

RAIL EQUIPMENT

1—9x14-in. 36-in. Gauge Porter Saddle Tank Engine.
6—4-yard Western Side Dump Cars, 36-in. Gauge.
8—36-in. Gauge End Dump Quarry Cars.

HOISTS

1—7½x10-in. 2-Drum Lidgerwood Cableway Hoist with 500 ft. 1½-in. Steel Cable and 1500 ft. ¾-in. Cable with Travelers complete.
1—8¾x10-in. Single Drum Lidgerwood.

CRUSHERS

3—24-in. Symons Disc Crushers.
1—30-in. Jeffrey Swing Hammer Pulverizer.
18 ft. Screw Conveyor.

DREDGE MACHINERY

1 set of Dipper Dredge Machinery complete with two-yard Dipper.

All machinery and equipment in first class condition. Complete description and prices upon request.

The Ohio Gravel Ballast Company
2103 Union Central Bldg., Cincinnati, O.

"Everything for the Quarry"

1—⅝-yd. Thew "O" Traction Shovel.
1—8-ton Davenport Type "D" Caterpillar Crane.
1—3-ton Std. Ga. Plymouth Gasoline Locomotive.
1—7x12 cyl. 36-in. gauge Porter Saddle Tank.
1—9x14 cyl. 36-in. gauge Vulcan Saddle Tank.
1—10x16 cyl. 36-in. gauge Davenport Saddle Tank.
1—11x16 cyl. 36-in. gauge American Saddle Tank.
20—36-in. gauge 4-yd. Western Dump Cars.
3—16-yd. Western Air Dump Cars.
5—60,000-lb. Cap. Side Dump Ballast Cars.
RAILS—Track Material—Hoists—Boilers—Derricks—Pipe.

ZELNICKER IN ST. LOUIS

Big Bulletin 290—Just Out—Get YOUR Copy Now.

NO. 8-D, GATES GYRATORY CRUSHER

STANDARD DRIVE

Fitted with manganese head and concaves. Included with this crusher, we have the following extra spare parts:

1 New, Manganese head.
1 New, set of manganese concaves.
1 New, main shaft.
1 New, Spider, and 2 New, eccentrics.

We also have many other sizes and types. We specialize in good quarry equipment of all classes. Write us fully.

Reading Engineering Co., Inc.
1227 Tribune Bldg., New York, N. Y.

FOR SALE

1,000 feet of 1⅝" Plow Steel Cable, made by Hazard Mfg. Co. Never off original reel from factory. $600.00 F. O. B. Plant.

1 two-yard and 1 one and one-half yard Cable Excavator drag line bucket in fair condition. $400.00 each, F. O. B. Plant.

Wyoming Sand & Stone Co.
WILKES-BARRE, PA.

For Sale

Immediate Delivery

13x34 Brown Corliss Engine.
16x42 and 15x36 Putnam Engines.
2 Coppus Blowers.
72x18 R T Boiler, 110 lbs.
72x16 R T Boiler, 125 lbs.
66x16 R T Boiler, 115 lbs.
6 kw. 66 amp. E L Outfit, inc. engine.
100-h.p. Webster Feedwater Heater.
Small Engines, Generator, etc.

The Atlas Mineral Products Co.
Kempton, Pa.

Machinery For Sale

DRYERS—Direct-heat rotary dryers, 3x25', 3½x25', 4x30', 5½x50' 6x50' and 7x60'; double shell dryers, 4x20', 5x30' and 6x35'; steam-heated air rotary dryers, 4x30' and 6x30'.

KILNS—Rotary kilns, 3½x25', 5x60' and 6x70', 6x100', 7x80' and 8x110'.

MILLS—6x8', 6x5', 2½x3" 3x3½' pebble and ball mills; 8x4', 6x4' and 4x4' continuous ball mills; 3' March mill; 42", 33" and 24" Fuller-Lehigh mills; **4½x20', 5x11', 5x20', 5½x22' and** 6x20' tube mills; 7½x13", 9x15", 16x10" and 30x60" jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; **one Kent type "G" mill; 36" and** 40" cage mills; 3' and 4½' Hardinge mills; 18x12", 20x12" and 30x10" roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one **No. 2 Sturtevant ring roll crusher; 3 roll and** No. 000, No. 00 and No. 0 Raymond mills; one No. 5 Telsmith breaker; one 36" Sturtevant emery mill; one 3 roll Griffin mill; 60" chaser mill.

SPECIALS—Five automatic package weighing machines; jigs; one keystone excavator; 6x8', 6x5' and 4x3' Newaygo vibrating screens, Richardson automatic scales.

Air compressors and tanks.

W. P. Heineken, Engineer
95 Liberty Street, New York. Tel. Cortland 1841

FOR SALE

9x16" Climax Jaw Crusher mounted on I-beams and trucks.
No. 2 Style D. Gates Gyratory Crusher.
75 H.P. 13" bore by 16" stroke, side crank Erie City Steam Engine.
125 H.P. 18" bore by 24" stroke, side crank Atlas Steam Engine. Shop No. 25197.
12x12" Lidgerwood Standard, double cylinder, 2 drum cableway engine.
600 lineal feet 1¾" Roebling Wire Cable—never used.
100—H.P. Motor; 100 K.W. Generator, 60 cycles, 550 volts, maker Fairbanks & Morse. Both new. Address.

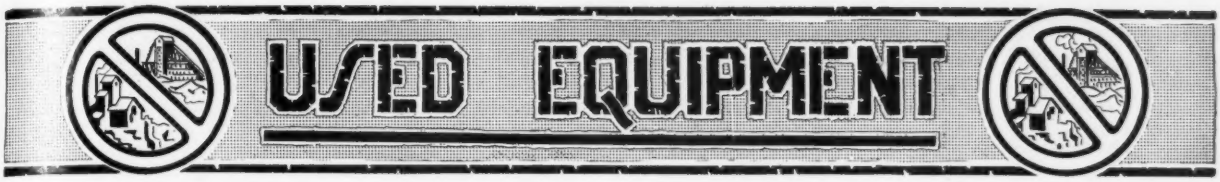
E. W. Cooper, Engineer
2010 Locke Ave. Nashville, Tennessee

FOR SALE

One piece new Goodyear Conveyor Belt, 47 ft. long, 40 in. wide, 6 ply, $5.00 per lin. ft., with ⅛-in. Rubber Cover on carrying side. This belt is being sold at this price on account of being the wrong size for our use.

DOOLEY BROTHERS
Peoria, Illinois

Have you a plant for sale? Do you wish to purchase a plant? Are you in need of a superintendent or manager? Are you looking for a position as plant superintendent or manager? Advertise your wants in these columns for quick results.



Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. please send check with your order. These ads must be paid in advance of insertion.

Repaired Contractors' Equipment

Steam Shovels

Model 60 Marion Shovels, 2½-yard dippers, Nos. 1999, 2059, 2130

1—Model 1 Thew, on railroad trucks, ⅞-yard dipper.

1—Bucyrus Model 70-C, Shop No. 1219.

We have a large stock of thoroughly repaired Construction Equipment of all kinds ready for immediate shipment.

Locomotives

8—18-ton, 10x16″ Porter Dinkeys, 36″ gauge.
2—12-ton, 9x14″ Porter Dinkeys, 36″ gauge.
1—17x24″, 55-ton, 4-6-0, standard gauge.
3—25-ton Forney type.

Clam Shell Buckets

1—1¼-yard Williams Hercules Bucket.

Cars

30—Western Air Dump 12-yard, standard gauge.
40—Western 4-yard, 36″ gauge, steel beam.

H. KLEINHANS COMPANY

Union Arcade **Pittsburgh, Pa.**

Crushing and Pulverizing Equipment

1—No. 8 Gates Gyratory Crusher.
6—Blake Type Jaw Crushers.
1—42″ Fuller Mill.
2—No. 3 Williams Universal Mills.
6—Sets Cornish Geared Crushing Rolls.
Elevators and Conveyors.

THE MACHINERY & SUPPLY CORPORATION
Joplin, Missouri

FOR SALE

One second hand No. 5 Good Roads Crusher, with opening 11″x26″, in excellent condition; a real bargain to a quick buyer. Address

Box 1453 **Care of Rock Products**

Equipment for Sale

Sauerman Dragline Excavator Outfit Complete, Including

1—100-ft. Lattice Steel Tower.
1—1½-yd. Bucket and Carrier, with extra new bottom; never been used.
900 ft. 1⅜ Track Cable, good condition.
850 ft. ¾ Hauling Cable in good condition.
1—Thomas Elevator Co. Double Drum Two Speed Hoisting Engine.
1—100-H.P. Alternating Current Motor.

All in good working condition. Hoisting Engine practically good as new. Located in Erie, Pennsylvania. Also one Besser Concrete Block Machine. For particulars, address

DOWNING GRAVEL PIT
1117 State Street Erie, Pennsylvania

WANTED

Second hand grinding mills, Griffin type preferred; also a good crusher of the Pan type. Address

Box 1475 **Care of Rock Products**

Immediate Delivery

8 and 9 K Crushers Reg. Drv.

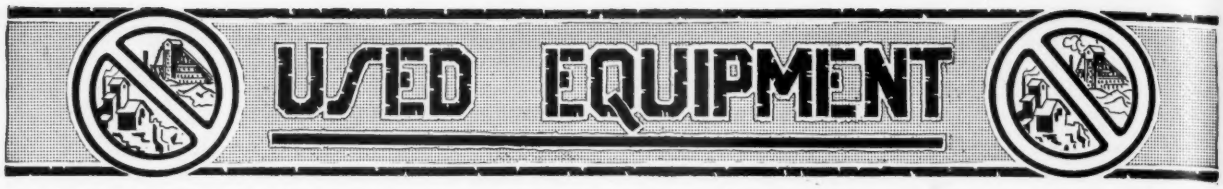
2—150 H.P. 125 lbs. H.R.T. boilers, buttstrap.
4—No. 6 Gates (Mang. Fit) nickel steel shafts.
1—No. 7½ and 1 No. 8 Gates reg. drive.
No. 4 Telsmith Plant, A.C. motor drive.
Air Compressors (steam-belt) 50 to 4000 ft.
40 Boilers, 60-150 H.P., 100-130-lb.
25—60 and 100 H.P. Ver. Boilers.
4—NEW No. 4 Gates, Mang. Fit. $1750 ea.
25 H.P. Ver. Boiler, buttstrap, Ind.
Type "O"—¾-yd. Thew steam shovel.
2—60-IN. EDISON ROLL CRUSHERS
2—156 Kva., 240 V., 60 Cy., 3 Ph. Eng. Sets.
2—18 in. & 24 in. DISC CRUSHERS.
Send us your inquiries, Pumps, Steam and Electric 50 Kw., 125 V., Dir. Cur. Eng. Set, $800. Equipment, etc.

ROSS POWER EQUIP. CO.
Indianapolis, Ind.

WISH TO BUY

One Ingersoll Rand 9x14″ Air Compressor. Rating 140 cu. ft. per minute. Electric driven.

BUFFALO CEMENT CO., LTD.
110 Franklin St., Buffalo, N. Y.



Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

Locomotives for Rent or Sale

2—50-ton 18x24 in. six-wheel switchers.
1—40-ton 17x24 in. four-wheel switcher.
1—40-ton Vulcan four-driver saddle-tank.
2—18-ton and 14-ton 36-in. gauge Vulcans.
2—10-ton 7x12 in. 36-in. gauge Vulcans.
1—10-ton 36-in. gauge Shay geared.

Miscellaneous

1—Marion 35 steam shovel on traction wheels.
1—Marion 76 steam shovel, No. 3503.
1—Lidgerwood dragline, 60-ft. boom, 2-yd. bucket.
100—60,000-lb. capacity box cars, 40-ft. long.
40—60,000-lb. capacity flat cars, 36-ft. long.
13—6-yd. dump cars, 4-ft. 8½-in. gauge.
12—1½-yd. "V" steel dump cars, 36-in. gauge.
1—Western standard gauge spreader.
2-in., 4-in., and 6-in. simple, duplex, and centrifugal pumps, 10 H.P. and 45 H.P. upright boilers, tripod drills, etc.

LOCOMOTIVE CRANES, RAILWAY EQUIPMENT, etc.

INDUSTRIAL EQUIPMENT CO.
McCormick Building, Chicago, Ill.

FOR SALE

2—13-ton Standard-gauge Whitcomb Gasoline Locomotives.
1—Class "G" Ingersoll-Rand Air Compressor, 925-ft.
1—Class "H" Ingersoll-Rand Air Compressor, 342-ft.
1—Aerial Tramway System, 1100-ft. centers, with 12 buckets and carriers, 2650 ft. ¾ in. pulling cable, with 1¾ in. and 1¼ in. carrying cable, with sheaves, counterweight equipment, 65 H. P. motor and speed reduction gears complete.

THE CASPARIS STONE CO.
Columbus, Ohio

WANTED

Ingersoll-Rand Electric Channelers. Advise fully location, price and condition. Address

Box 1477 Care of Rock Products

FOR SALE

Ohio Locomotive Crane

8 wheel type, 50′ boom, new boiler. Handles one yard clam shell. For quick sale, $8500.00. Bargain.

GRAND RAPIDS GRAVEL CO.
Grand Rapids, Mich.

CRUSHER

Style "D" Gates Size No. 8, 18x68-in. openings. Weight-breaker 100,000 lbs. Capacity 150 to 200 tons per hour. Immediate delivery. Price right.

E. C. Sherwood, 50 Church St., New York

New—RAILS—Relaying

All sections on hand for quick shipment. Reasonable prices quoted. Our stock is very complete.

M. K. FRANK
Frick Building Pittsburgh, Pa

Idle Machinery Absorbs Profits

This department is the medium for the men who keep the wheels going. Sell your idle machinery to the man who'll keep it going.

PRESTON K. YATES

Designer and Construction Engineer

Of Stone Crushing Plants, Conveying and Storage Systems, Quarry Operations, Rotary Lime Kilns, etc.

120 Broadway . . . New York

Geo. B. Massey Company
Consulting Engineers
EXCAVATION

Opening up and economical development of stone quarries, sand, gravel and clay deposits.
Hydraulicking. Stripping.
Centrifugal pumping and hydraulic dredges.
Most suitable machinery and methods to insure lowest costs.
Design and construction of complete plants.
Engineering supervision.
Inspection of new and second hand machinery.

Booklet on excavating machinery on request

Peoples Gas Building, Chicago

F. L. SMIDTH & CO.

50 CHURCH STREET NEW YORK

Engineers

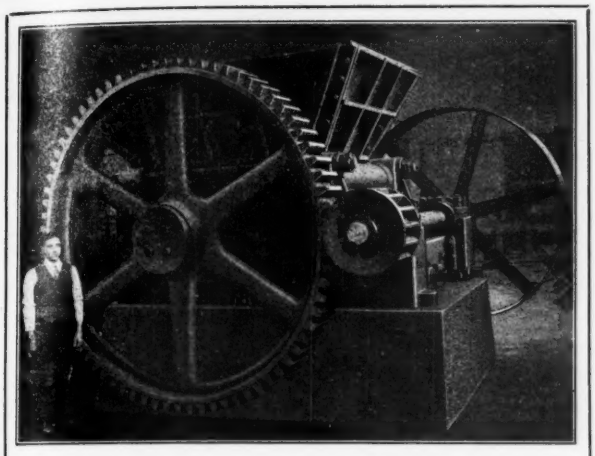
CEMENT MANUFACTURING PLANTS
CEMENT MAKING MACHINERY
PULVERIZED COAL INSTALLATIONS
GRANULATING AND PULVERIZING MACHINES FOR ALL MATERIALS
FLINT PEBBLES—SILEX LINING
THE LENIX BELT DRIVE

When in the market for machinery or equipment, look through the advertisements of ROCK PRODUCTS. If you do not find what you want advertised in this issue, write us and we will put you in touch with reliable firms who can supply your need. This service is free to our reader.. Use it.

Rock Products

The Nation's Business Magazine of the Rock Products Industry

542 So. Dearborn St. Chicago, Illinois



If you had seen the McLanahan Single Roll Crusher before ordering your first Gyratory or Jaw Crusher, you would now be running only the McLanahan Crushers.

After many years' practical experience building and operating other crushers, we brought out the first Single Roll Crusher, proved it best, simplest and most economical—making least fines—requires but little head room—no apron or hand feeding—takes wet or slimy material.

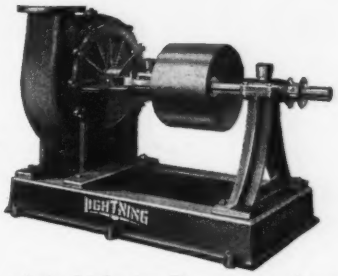
Capacity, 5 to 500 Tons per Hour

McLanahan-Stone Machine Co.
Hollidaysburg, Pa.
Screens, Elevators, Conveyors, Rock Washers, etc.

The Lightning Sand Pump

Is No Loafer!

Operate like a flash! Adjusts in a flash! Parts replaced like a flash!



The life of the Lightning Pump is one long, unbroken streak of production.

Simple in design and construction.
Drum removable and adjustable to any position.
Drum plate quickly removable.
Ball thrust bearings, front and rear.
Chilled bumper in sand drum provides long wear.
Bumper quickly replaced.
Detailed description with prices on application.

Address Pump Dept.

Kansas City Hay Press & Tractor Co.
Kansas City, Mo.

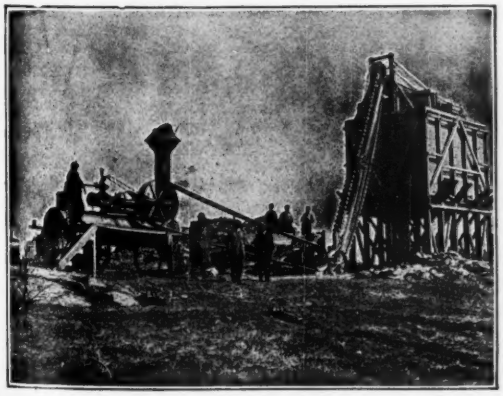
Hettrick Canvas Belting

Some of our customers call the Hettrick the greatest belting in the world—they actually mean that it is the most trustworthy, the most constant and the most dependable belting in the world.

The day-in-and-day-out demands imposed on the Hettrick merely demonstrate its wonderful reliability, satisfaction and the fact that quality is built into every part of it.

Our guarantee of service carries conviction.

The Hettrick Mfg. Company, Toledo, Ohio



COMPLETE INSTALLATIONS

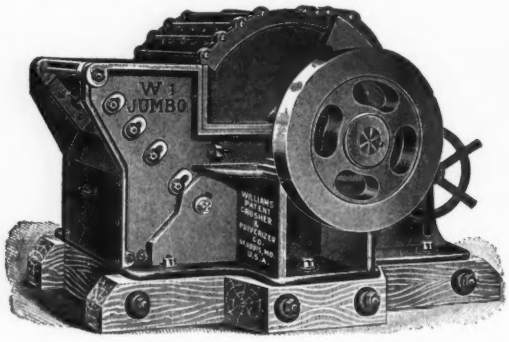
For Stone Quarries or Lime Plants

We are prepared to build and superintend the installation of all equipment necessary to start operations.

Reliance Products are equal to the best and we know that our engineers can save you money by their recommendations. Prompt deliveries.

Let Us Quote You Prices

Universal Road Machinery Co.
Kingston, N. Y.
Reliance Quarry and Road Building Equipment



Williams Crushers

Williams Jumbo Crushers are used in quarries as secondary crushers, taking 10-inch and under limestone, as it comes from the primary crushers, and reducing the material to 1½-inch, 1¼-inch or 1-inch and under in one operation. These machines are built in capacities ranging from 30 tons to 300 tons per hour. Many are now in operation. Complete details concerning these crushers are found in bulletin No. 4-B.

WILLIAMS PATENT CRUSHER AND PULVERIZER COMPANY
HINGED HAMMER — ESTABLISHED 1871

PLANT & OFFICES 2701 N. BROADWAY ST. LOUIS, MO

GENERAL SALES OFFICES 37 W. VAN BURAN STREET Chicago, Ill.

WESTERN OFFICE 67 SECOND ST SAN FRANCISCO CALIF

BATES WIRE TIES

for tying reinforcement in concrete construction

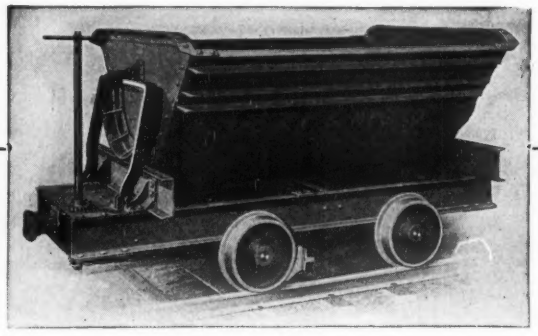
Ties all kinds of reinforcement effectively —mesh, bars, metal lath, expanded metal. Also used in the manufacture of concrete pressure pipe and sewer pipe.

A handy tool which means efficiency and speed to the workman—a money saving device to the contractor.

Write for illustrated price list.

We also make the Bates Packer for packing cement, ground limestone, etc.

BATES VALVE BAG COMPANY
7310 South Chicago Avenue
CHICAGO, ILL.
W. I. 110 Great Portland St., London, Eng.

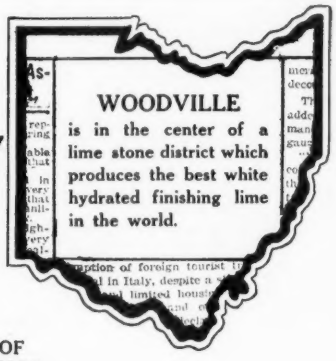


More Than Reinforced

Reinforcing a dump car makes it stronger, of course. But there is a best way to reinforce. Atlas cars are reinforced the best way. Why? Simply because we have built dump cars so long and for so many people that we know just where the reinforcing should go and just how it should be done.

Not much wonder, then, that Atlas dump cars stand the "gaff" better than the average.

The Atlas Car & Manufacturing Co.
ENGINEERS MANUFACTURERS
CLEVELAND, OHIO, U. S. A.



BUILDERS OF
THE "ARNOLD"
LIME KILN AND
LINING

LOCATED
IN THIS DISTRICT

ARNOLD & WEIGEL
CONTRACTORS AND ENGINEERS
WOODVILLE, OHIO

Buyers' Guide of the Rock Products Industry

Classified Directory of Advertisers in Rock Products

Air Compressors
Worthington Pump & Mach. Co.
New York, N. Y.

Bags and Bag Machinery
Bates Valve Bag Co.
Chicago, Ill.
Jaite Co., The
Jaite, Ohio
Miller, Tompkins & Co
New York City.
Valve Bag Co. of America
Toledo, Ohio.

Belting
Cincinnati Rubber Mfg. Co.
Cincinnati, Ohio.
Hettrick Mfg. Co.
Toledo, Ohio
New York Belting & Packing Co.
New York, N. Y.
U. S. Rubber Co.
New York, N. Y.

Brick Machines
Shope Brick Co.
Portland, Ore.
L. V. Thayer
New York, N. Y.
Wert Mfg. Co.
Chicago, Ill.

Blasting Supplies
Du Pont de Nemours & Co., E. I
Wilmington, Del.
Grasselli Powder Co.
Cleveland, Ohio.

Buckets, Elevator
Hendrick Mfg. Co.
Carbondale, Pa.
Orton & Steinbrenner
Chicago, Ill.

Buckets
Advance Eng. Co.
Cleveland, O.
Austin Mach. Corp.
Chicago, Ill.
Brown Hoisting Mach. Co.
Cleveland, Ohio.
Browning Co.
Cleveland Ohio.
Marion Steam Shovel Co.
Marion, Ohio.
McMyler Interstate Co.
Cleveland, Ohio.
Owen Bucket Co.
Cleveland, Ohio.

Cableways
S. Flory Mfg. Co.
Bangor, Pa.

Calcining Machinery
Atlas Car & Mfg. Co.
Cleveland, Ohio.
Butterworth & Lowe
Grand Rapids, Mich.

Cement Machinery
Allis-Chalmers Mfg. Co.
Milwaukee, Wis.

Chains and Transmitting Machinery
Columbus-McKinnon Chain Co.
Columbus, O.
U. S. Chain & Forging Co.
Pittsburgh, Pa.

Chains, Dredge
U. S. Chain & Forging Co.
Pittsburgh, Pa.

Conveyors and Elevators
Caldwell H. W., & Son Co.
Chicago, Ill.
Gifford-Wood Co.
Hudson, N. Y.
Jeffrey Mfg. Co., The
Columbus, Ohio.
Link Belt Co.
Chicago, Ill.
Robins Conveying Belt Co.
New York, N. Y.
Smith Eng. Works
Milwaukee, Wis.
Stephens-Adamson Mfg. Co.
Aurora, Ill.
Sturtevant Mill Co.
Boston, Mass.
Universal Road Mach. Co.
Kingston, N. Y.

Cranes—Locomotive Gantry
Advance Eng. Co.
Cleveland, O.
Ball Engine Co.
Erie, Pa.
Brown Hoisting Mach. Co.
Cleveland, Ohio.
Browning Co.
Cleveland, Ohio.
Byers Mach. Co., The.
Ravenna, Ohio.
Chisholm-Moore Mfg. Co.
Cleveland, Ohio.
McMyler-Interstate Co.
Cleveland, Ohio.
Ohio Locomotive Crane Co.
Bucyrus, Ohio.
Orton & Steinbrenner
Chicago, Ill.
Osgood Co., The
Marion, Ohio.

Crushers and Pulverizers
Allis-Chalmers Mfg. Co.
Milwaukee, Wis.
American Pulverizer Co.
St. Louis, Mo.
Austin Mfg. Co.
Chicago, Ill.
Bacon, Earle C., Inc.
New York, N. Y.
Buchanan Co., Inc., C. G.
New York, N. Y.
Butterworth & Lowe
Grand Rapids, Mich.
Chalmers & Williams
Chicago Heights, Ill.
Good Roads Mach. Co.
Philadelphia, Pa.
Gruendler Pat. Crusher & Pulv. Co.
St. Louis, Mo.
Jeffrey Mfg. Co., The
Columbus, Ohio.
K. B. Pulverizer Co.
New York, N. Y.
Kennedy-Van Saun Mfg. & Eng. Corp.
New York, N. Y.
Kent Mill Co.
Brooklyn, N. Y.
Lewistown Fdry. & Mach. Co.
Lewistown, Pa.
McLanahan-Stone Mach. Co.
Hollidaysburg, Pa.
Munson Mill Machinery Co.
Utica, N. Y.
Pennsylvania Crusher Co.
Philadelphia, Pa.
Raymond Bros. Impact Pulverizer Co.
Chicago, Ill.
Smidth & Co., F. L.
New York, N. Y.
Smith Eng. Works
Milwaukee, Wis.
Sturtevant Mill Co.
Boston, Mass.
Stevenson Co.
Wellsville, O.
Traylor Eng. & Mfg. Co.
Allentown, Pa.
Universal Crusher Co.
Cedar Rapids, Iowa.
Universal Road Mach. Co.
Kingston, N. Y.
Webb City & Carterville F. & M. Works
Webb City, Mo.
Williams Pat. Crush. & Pulv. Co.
Chicago, Ill.
Worthington Pump & Mach. Corp.
New York, N. Y.

Derricks
Terry Mfg. Co.
New York, N. Y.

Dipper Teeth
American Manganese Steel Co.,
Chicago Heights, Ill.
Taylor-Wharton Iron & Steel Co.
High Bridge, N. J.

Dragline Buckets
Brown Hoisting Mach. Co.
Cleveland, Ohio

Drills
American Well Works
Aurora, Ill.
Armstrong Mfg. Co.
Waterloo, Iowa.
Sanderson Cyclone Drill Co.
Orrville, Ohio
Wood Drill Works
Paterson, N. J.

Dryers
American Process Co.
New York City.
Vulcan Iron Works
Wilkes-Barre, Pa.

Dynamite
Du Pont de Nemours & Co., E. I.
Wilmington, Del.
Grasselli Powder Co.
Cleveland, Ohio.

Engines, Oil & Gas
Power Mfg. Co.
Marion, Ohio
Worthington Pump & Mach. Co
New York, N. Y.

Engines, Steam
Morris Mach. Works
Baldwinsville, N. Y.

Engineers
Alden, Wilterding & Scott
Toledo, Ohio
Arnold & Weigel
Woodville, Ohio
Bacon, Earle C., Inc.
New York, N. Y.
Buckbee Co., J. C.
Chicago, Ill.
Fuller Engineering Co.
Allentown, Pa.
James N. Hatch
Chicago, Ill.
R. W. Hunt & Co.
Chicago, Ill.
Massey Co., Geo. B.
Chicago, Ill.
Smidth & Co., F. L.
New York, N. Y.
Schaffer Eng. & Equip. Co.
Pittsburgh, Pa.
Yates, Preston K.
New York, N. Y.

Excavators
Ball Engine Co.
Erie, Pa.
Green, L. P.
Chicago
Marion Steam Shovel Co.
Marion, Ind.
Owen Bucket Co.
Cleveland, Ohio.

Excavators—Dragline Cableway
Link Belt Co.
Chicago, Ill.

Sauerman Bros.
Chicago, Ill.

Explosives

Du Pont de Nemours & Co., E. I.
Wilmington, Del.

Grasselli Powder Co.
Cleveland, Ohio.

Fuses

Ensign-Bickford Co.
Simsbury, Conn.

Gas Producers

Chapman Eng. Co.
Mt. Vernon, Ohio.

Cooper Co., C. & G.
Mt. Vernon, Ohio

Morgan Construction Co.
Worcester, Mass.

Gears

Caldwell, H. W. & Son Co.
Chicago, Ill.

Generators

Sorgel Electric Co.
Milwaukee, Wis.

Glass Sand Equipment

Lewistown Fdy. & Mach. Co.
Lewistown, Pa.

Grinding Mills

Munson Mill Machinery Co.
Utica, N. Y.

Hoists

Chisholm-Moore Mfg. Co.
Cleveland, Ohio

Flory Mfg. Co., S.
Bangor, Pa.

Vulcan Iron Works
Wilkes-Barre, Pa.

Hose—Water, Steam, Air Drill, Pneumatic Tool

Cincinnati Rubber Mfg. Co.
Cincinnati, O.

N. Y. Belting & Packing Co.
New York, N. Y.

Hydrating Machinery

Atlas Car & Mfg. Co.
Cleveland, Ohio

Kritzer Co., The
Chicago, Ill.

Miscampbell, H.
Duluth, Minn.

Schaffer Eng. & Equip. Co.
Pittsburgh, Pa.

Toepfer & Sons Co., W.
Milwaukee, Wis.

Hydraulic Dredges

Morris Machine Works
Baldwinsville, N. Y.

Industrial Cars

Atlas Car & Mfg. Co.
Cleveland, Ohio

Austin Mach. Corp.
Chicago, Ill.

Easton Car & Constr. Co.
Easton, Pa.

Watt Mining Car Wheel Co.
Barnesville, Ohio

Lime Kilns

Arnold & Weigel
Woodville, Ohio

Glamorgan Pipe & Fdy. Co.
Lynchburg, Va.

Steacy-Schmidt Mfg. Co.
York, Pa.

Vulcan Iron Works
Wilkes-Barre, Pa.

Loaders and Unloaders

Austin Machinery Corp.
Chicago, Ill.

Ball Engine Co.
Erie, Pa.

Gifford-Wood Co.
Hudson, N. Y.

Jeffrey Mfg. Co., The
Columbus, Ohio

Locomotives

Baldwin Locomotive Works, The
Philadelphia, Pa.

Fate-Root-Heath Co.
Plymouth, Ohio

Hadfield-Penfield Steel Co.
Bucyrus, Ohio

Jeffrey Mfg. Co., The
Columbus, Ohio

Lima Locomotive Works
New York, N. Y.

Porter Co., H. K.
Pittsburgh, Pa.

Vulcan Iron Works
Wilkes-Barre, Pa.

Whitcomb Co., Geo. D.
Rochelle, Ill.

Motors, Electric

Gifford-Wood Co.
Hudson, N. Y.

Sorgel Electric Co.
Milwaukee, Wis.

Motor Trucks

Pierce-Arrow Motor Car Co.
Buffalo, N. Y

Traylor Eng. & Mfg. Co.
Allentown, Pa.

Packing—Sheet, Piston, Superheat, Hydraulic

Cincinnati Rubber & Mfg. Co.
Cincinnati, Ohio

N. Y. Belting & Packing Co.
New York, N. Y.

Paint and Coatings

Williams, C. K., & Co.
Easton Pa.

Perforated Metals

Chicago Perforating Co.
Chicago, Ill.

Cross Eng. Co.
Carbondale, Pa.

Harrington & King
Chicago, Ill.

Hendrick Mfg. Co.
Carbondale, Pa.

Nortmann Duffke Co.
Milwaukee, Wis.

Plaster Machinery

Butterworth & Lowe
Grand Rapids, Mich.

Ehrsam & Sons Co., J. B
Enterprise, Kan.

Portable Conveyors

Stephens-Adamson Mfg. Co.
Aurora, Ill.

Pumps

Allis-Chalmers Mfg. Co.
Milwaukee, Wis.

American Manganese Steel Co.
Chicago Heights, Ill.

American Well Works
Aurora, Ill.

Kansas City Hay Press & Tractor Co.
Kansas City, Mo.

Morris Machine Works
Baldwinsville, N. Y.

Worthington Pump & Mach. Co.
New York, N. Y.

Power Transmitting Machinery

Caldwell H. W., & Son Co.
Chicago, Ill.

Powder

Du Pont de Nemours & Co., E. I.
Wilmington, Del.

Grasselli Powder Co.
Cleveland, Ohio

Pulverized Fuel Equipment

Raymond Bros. Impact Pulv. Co.
Chicago, Ill.

Pump Valves

N. Y. Belting & Packing Co.
New York, N. Y.

Quarry Equipment

Marion Steam Shovel Co.
Marion, Ohio

Universal Road Mach. Co.
Kingston, N. Y.

Rails

Hyman-Michaels Co.
Chicago, Ill.

Rope, Wire

American Steel & Wire Co.
Chicago, Ill.

Leschen, A. & Sons Co.
St. Louis, Mo.

Scrapers, Drag

Green, L. P.
Chicago, Ill.

Sauerman Bros.
Chicago, Ill.

Screens

Cross Eng. Co.
Carbondale, Pa.

Gifford-Wood Co.
Hudson, N. Y.

Hendrick Mfg. Co.
Carbondale, Pa.

Jeffrey Mfg. Co., The
Columbus, Ohio

Link Belt Co.
Chicago, Ill.

National Engineering Co.
Chicago, Ill.

Smith Eng. Works
Milwaukee, Wis.

Stephens-Adamson Mfg. Co.
Aurora, Ill.

Stimpson Equip. Co.
Salt Lake City, Utah

Sturtevant Mill Co.
Boston, Mass.

Tyler Co., The W. S.
Cleveland, Ohio

Universal Road Mach Co.
Kingston, N. Y.

Separators

Rupert M. Gay Co.
New York City.

National Engineering Co.
Chicago, Ill.

Raymond Bros. Impact Pulv. Co.
Chicago, Ill.

Sturtevant Mill Co.
Boston, Mass.

Tyler Co., The W. S.
Cleveland, Ohio

Separators, Magnetic

Buchanan Co., C. G., Inc.
New York, N. Y.

Shovels—Steam and Electric

Austin Mach. Corp.
Chicago, Ill.

Ball Engine Co.
Erie, Pa.

Bucyrus Co.
S. Milwaukee, Wis.

Marion Steam Shovel Co.
Marion, Ohio

Osgood Co., The
Marion, Ohio

Shoveling Machines

Myers-Whaley Co.
Knoxville, Tenn.

Speed Reducing Transmission

James, D. O., Mfg. Co.
Chicago, Ill.

Testing Sieves and Testing Sieve Shakers

Tyler Co., The W. S.
Cleveland, Ohio

Track Equipment

Central Frog & Switch Co.
Cincinnati, Ohio

Easton Car & Constr. Co.
Easton, Pa.

Trolleys

Brown Hoisting Mach. Co.
Cleveland, Ohio

Turntables

Easton Car & Const. Co.
Easton, Pa.

Washers, Sand and Gravel

Link Belt Co.
Chicago, Ill.

Smith Eng. Works
Milwaukee, Wis.

Wire Rope

American Steel & Wire Co.
Chicago, Ill.

Leschen, A., & Sons Co.
St. Louis, Mo.

Wire Cloth

Cleveland Wire Cloth Co.
Cleveland, Ohio

Tyler Co. The W. S.
Cleveland, Ohio

Free Service to Readers of

Rock Products

If you are in the market for any kind of machinery, equipment or supplies, or if you desire catalogs, information or prices on any product, simply check off your wishes on the following list and mail to ROCK PRODUCTS. We are at your service—to obtain for you, without expense, catalogs, prices or specific information on every kind of machinery, equipment and supplies—or to help you find the hard to find source of supply. Instead of writing to many concerns or spending time hunting up information, etc., the one request to ROCK PROUCTS brings the complete data you desire.

What can we do for you? Use the following list for convenience. Check what you are in the market for, sign and mail to us.

RESEARCH SERVICE DEPARTMENT

ROCK PRODUCTS, 542 So. Dearborn St., Chicago, Illinois

Please send me catalogs and prices concerning the following items checked below:

..... Air Compressors.
..... Anvils.
..... Bags.
..... Bag Printing Machines.
..... Bagging Machines.
..... Belt Dressings.
..... Belting, Conveying.
..... Belting, Transmission.
..... Bins.
..... Bin Gates.
..... Blast Hole Drills.
..... Blasting Powder.
..... Bodies, Motor Truck.
..... Boilers.
..... Buckets.
..... Buildings, Portable.
..... Cable Coatings.
..... Cableways.
..... Calcining Machinery.
..... Cars.
..... Car Pullers.
..... Car Replacers.
..... Chain Drive.
..... Chain Hoists.
..... Chains, Steel.
..... Clips, Wire Rope.
..... Clutches.
..... Compressors.
..... Conveying Equipment.
..... Conveyors.
..... Cranes.
..... Crusher, Parts.
..... Crushing Plants.
..... Crushers.
..... Derricks.
..... Dragline Excavators.
..... Dragline Cableway Excavators.
..... Dredging Pumps.
..... Drill Steel.
..... Drill Sharpening Machinery.
..... Drills, Blast Hole.
..... Drills, Hand Hammer.
..... Drills, Tripod.
..... Dryers, Sand and Stone.
..... Dynamite.
..... Dump Cars.
..... Dump Wagons.
..... Dust Collecting Systems.
..... Elevators and Conveyors.
..... Elevating Equipment.
..... Engineering Service.
..... Engines, Gasoline.
..... Engines, Oil.
..... Fire Brick.
..... Forges.
..... Frogs and Switches.
..... Gas Producers.
..... Gear Speed Reducers.
..... Gears.
..... Generators, Electric.
..... Hand Shovels.
..... Hoisting Engines.
..... Hoists.
..... Hose, Air Drill.
..... Hose, Pneumatic Tool.
..... Hose, Steam.
..... Hose, Water.
..... Hydraulic Dredges.
..... Industrial Railways.
..... Lathes.
..... Lights, Carbide.
..... Lime Hydrators.
..... Lime Kilns.
..... Loaders, Car.
..... Loaders, Wagon.
..... Locomotive Cranes.
..... Locomotives, Electric.
..... Locomotives, Gasoline.
..... Locomotives, Steam.
..... Locomotives, Storage Battery.
..... Machine Shop Equipment.
..... Magnetic Separators.
..... Motors.
..... Motor Trucks.
..... Oil Storage.
..... Oils and Lubricants.
..... Packing, Hydraulic.
..... Packing, Piston.
..... Packing, Sheet.
..... Packing, Superheat.
..... Paints and Coatings.
..... Perforated Metal.
..... Picks.
..... Pipe, Iron.
..... Power Transmitting Equipment.
..... Pulleys.
..... Pulverizers.
..... Pumps, Centrifugal.
..... Pumps, Electric.
..... Pumps, Gasoline.
..... Pumps, Steam.
..... Pyrometers.
..... Rails.
..... Rock Drills.
..... Rope Drive.
..... Rope, Manila.
..... Safety Clothing, Etc.
..... Sand-Lime Brick Mchy.
..... Sand Pumps.
..... Sand Washing Boxes.
..... Scrapers.
..... Screening Equipment.
..... Screening Plants.
..... Screens.
..... Sheaves.
..... Steam Shovels.
..... Steel, High Speed.
..... Steel, Manganese.
..... Stokers, Automatic.
..... Stone Grapple.
..... Tanks, Steel.
..... Tanks, Wood.
..... Time Clocks.
..... Tracks.
..... Track Material.
..... Transformers, Electric.
..... Trip Hammers.
..... Unloaders.
..... Valves.
..... Washing Equipment.
..... Weighing Equipment.
..... Welding, Electric.
..... Welding, Oxy-Acetylene.
..... Winches.
..... Wire Cloth.
..... Wire Rope.
..... Wrenches.

Where Can I Buy.....

Who Manufactures .....

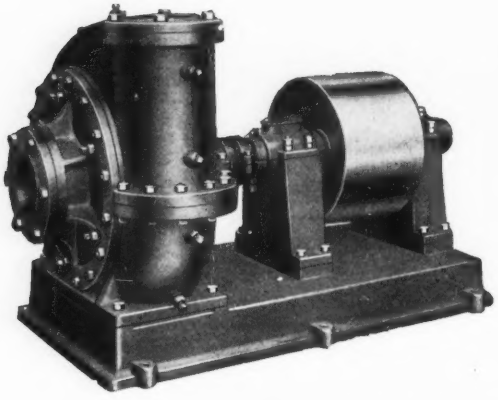
Am in the Market for.....

Name .....

Address .....

City .....State .....

INDEX TO ADVERTISEMENTS



MORRIS PUMPS

Since the civil war Morris Pumps have been reducing the costs of pumping operations and protecting very substantial investments of capital.

They have demonstrated their long life and uninterrupted service and the long list of users is the most impressive evidence of their practical worth.

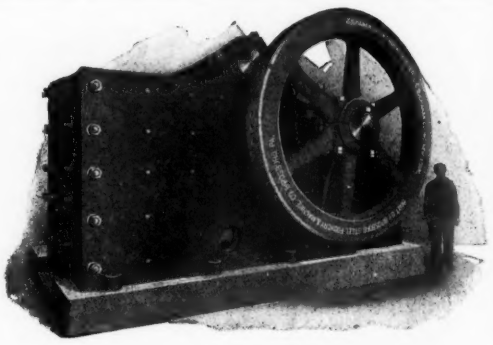
The lining of manganese steel completely protects the iron outer pump casing, and when this lining is worn it can be easily replaced.

Since the Civil War builders of Centrifugal Pumps, Hydraulic Dredges, Steam Engines

Morris Machine Works

Baldwinsville, New York

Representatives in All Principal Cities
New York Office, 39-41 Cortlandt St.; Chicago, 217 N. Jefferson St.; Philadelphia, Real Estate Trust Bldg.



Reduce Crushing Costs

with a Buchanan. They are simply constructed, yet are massive and rugged. Effect the most dependable efficiency possible and the greatest saving in cost of producing.

BUCHANAN JAW CRUSHERS

ALL STEEL PATENTED

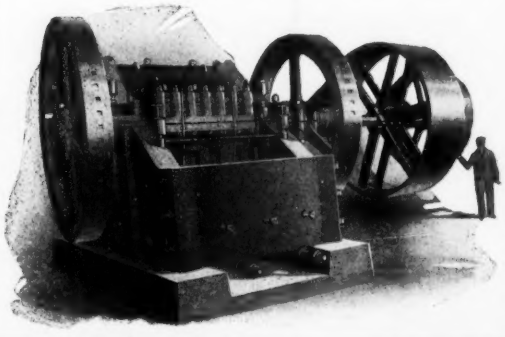
On the hardest rock or ore these machines will make a six-to-one reduction. That is, the size 60x84" will receive rock measuring approximately 60" in thickness and will reduce same to 10" and under, with the usual amount of fine material. The other sizes reduce in the same ratio, according to their respective sizes, and the quality of material.

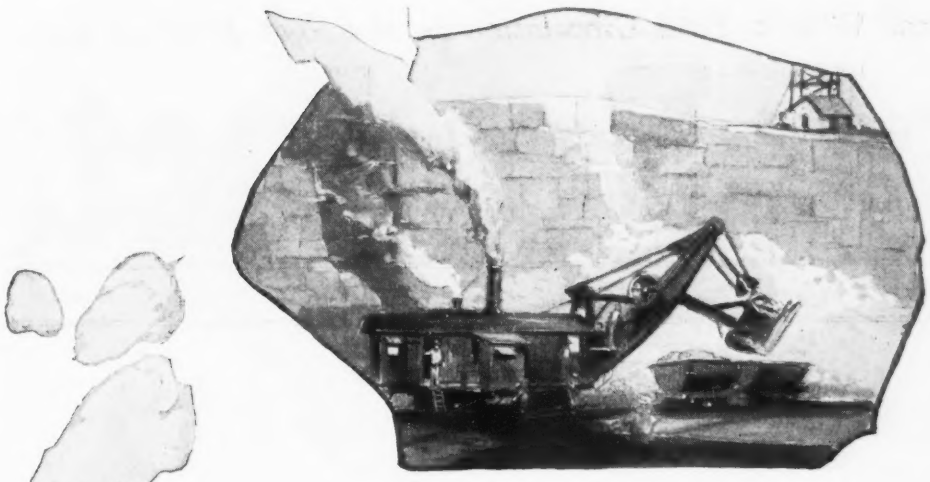
Send for Bulletin No. 10

C. G. Buchanan Co., Inc.

90 West Street New York

Crushing Machinery, Crushing Rolls and Magnetic Separators





Explosives that fit the job!

FOR every condition you meet in getting out rock, there's a Grasselli Explosive made for the job. Practical men have developed Grasselli Explosives, bearing in mind *all* the time *all* the work that explosives must do in quarries.

Consequence—more rock with less powder, and *very* little man labor.

Let our representative *show you* just what "Grasselli" will do in speeding production and cutting production costs for you. Tell us when.

The Grasselli Powder Company
Main Office, Cleveland, Ohio

Philadelphia
Pittsburgh
Chicago

CHEMICALS SPELTER GRASSELLI COLORS EXPLOSIVES

Wilkes-Barre
Pottsville
Uniontown, Pa.

GRASSELLI EXPLOSIVES

When writing advertisers please mention ROCK PRODUCTS